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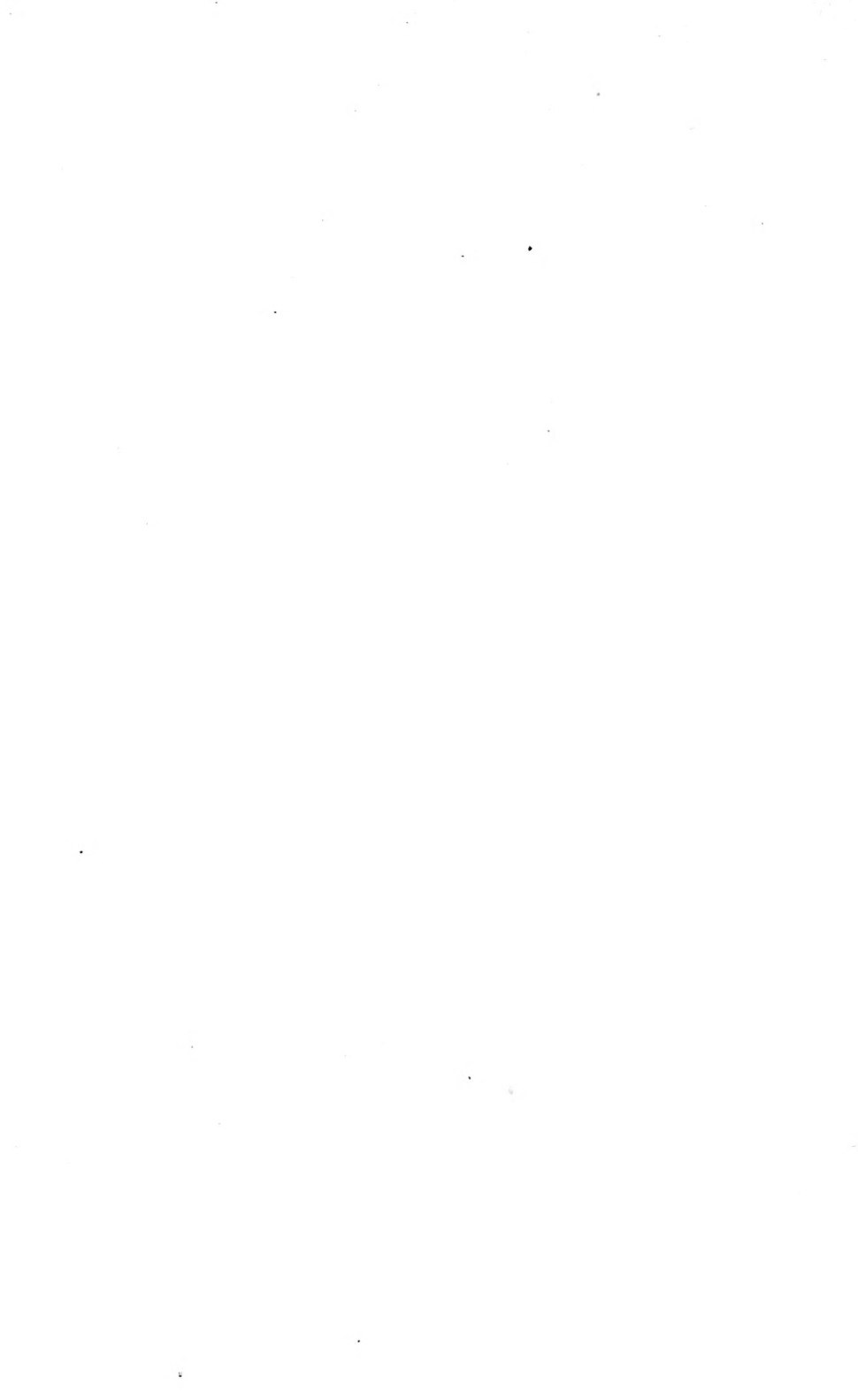
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Dear Sir,

Thank you for your
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Believe me to be
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AN INDEX
OF
SURGERY

BEING

A CONCISE CLASSIFICATION OF THE MAIN FACTS AND
THEORIES OF SURGERY, FOR THE USE OF SENIOR
STUDENTS AND OTHERS

BY

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To

THE COMMITTEE

AND TO MY COLLEAGUES ON THE STAFF

OF THE

WEST LONDON HOSPITAL

This little Book is Dedicated

AS A TOKEN OF RESPECT AND FRIENDSHIP

693465

PREFACE.

THIS book is intended to be read by the senior student shortly before he goes in for his final examination, and after he has carefully studied a complete text-book of surgery. When I was about to present myself at the final examination for the Fellowship of the College of Surgeons, I felt the need of some such work. I had read not only more than one manual, but several special treatises and various essays. I had had at least ordinary opportunities of practical work, and I do not think I had wasted them. But I had made no complete series of surgical notes, nor could I possibly have made such a series without having unduly narrowed my reading or trespassed on the time spent in the hospital wards. And this very narrowing, still more this very trespassing, would have made me unqualified to make a good note-book at all. For, to make good notes, one should have some practical experience and some breadth of view. How many men have had to put aside as useless the notes once laboriously made, but made with unripe knowledge, and with the bad judgment which such immaturity implies!

I am not dissuading students from taking notes while reading. The practice is highly to be commended for various reasons; for instance, it rivets the attention—an essential part of memory—and it frequently results in a note-book of high value, well worth reperusal. But the more honestly that note-book is made, the more likely will the student be to find the examination drawing swiftly near and his reading creeping along but slowly. He feels compelled to desert his note-book, and frequently his text-book too. He either skims on to the end of the latter, haste and anxiety preventing him from thoughtfully studying it, or he leaves it altogether for the smallest “Introduction” to surgery in the language. Now an “Introduction” or “Elementary Handbook” has its proper place in education; but that

proper place is not the time just before a final examination, especially when it comes in to thrust out a more profound and elaborate treatise.

If the student knew that there was a short book accessible, containing the main facts and theories of surgery put concisely, classified and arranged in due order, and without superfluous explanation, he would be able to really *study* his familiar text-book up to the last month before his examination, relying upon such a short book to give form to any knowledge which then remained nebulous in his mind.

These considerations convince me of the justness of the purpose of my book. Of its execution I will say nothing. The shortcomings of a book which, insignificant as it is, deals with questions of life and death, can scarcely be excused; they can only be lamented and condemned. But as I am convinced that it will do much more good than evil, and I believe I have done my best, I publish the work hopefully. These shortcomings would have been much greater if it had not been for the help in revision which has been given by Messrs. Alfred Street, Mills, Dunn, Alfred Back, Firth, and Charles Paget. Mr. STREET has gone over the whole book. I cannot thank him too warmly. My friend and pupil, Mr. Charles H. Taylor, has made the Index of Names.

MESSRS. DORAN, LYONS, and JULER have added contributions on Ovariectomy, Toothache, and Ophthalmic Surgery respectively.

Mr. Juler desires acknowledgment to be made of the help given by Mr. W. Adams Frost and Mr. W. Langdon, in the revision of the article on Ophthalmic Surgery.

Finally, I will express a hope that the practitioner, as well as the student, will occasionally find the book useful as a handy little work of reference.

20 PRINCES STREET, HANOVER SQUARE,
LONDON, W., September, 1881.

INDEX OF SURGERY.

Abdomen, Contusions of.—Always examine patient very carefully, but gently. Diagnose whether the viscera are injured or not. Three things protect against injury to the deeper structures, viz.: 1, thick and muscular abdominal walls; 2, empty state of the viscera; and 3, the patient's foreseeing and expecting the blow.

The parietal effects of a blow on the abdomen are: 1, rupture of muscle; 2, mere bruising (which, however, may be very serious in extent); 3, rupture of the peritoneum, with consequent extravasation of blood into peritoneal cavity. Rupture of a muscle causes temporary paralysis, swelling, etc. Sometimes the separation of the parts may be felt. *Abscess* may follow contusion, burrow widely, and cause most troublesome sinuses. Hemorrhage from ruptured peritoneum may be fatal. The collapse so produced is distinguished from the effect of ruptured intestine by the absence of great pain and vomiting, and by positive signs of internal hemorrhage.

A blow on the abdomen may cause serious and even fatal collapse without visceral injury, possibly by damaging the abdominal sympathetic system. *Treatment.*—Attend to collapse, internal hemorrhage, inflammation, and suppuration on general principles. Avoid purgatives. In case of peritonitis, use leeches, warm moist applications, and a liberal allowance of opium. Mercury in case of sthenic inflammation. When there is *injury to a viscus*, the particular one injured depends chiefly upon the place where the force is applied. Each viscus presents special symptoms. Liver and stomach most commonly suffer.

RUPTURE OF LIVER.—*Symptoms.*—Pain in hepatic region, signs of internal hemorrhage, peritonitis, bilious vomitings, white stools. Traumatic saccharine diabetes (Bernard).

RUPTURE OF GALL-BLADDER.—Great pain, collapse, and anxiety. Rapid death.

RUPTURE OF STOMACH.—Bloody vomiting, local pain, and general signs of abdominal injury.

RUPTURE OF INTESTINES.—Bloody stools and general signs of abdominal injury. Most frequently affects the jejunum. Emphysema.

RUPTURED SPLEEN.—Severe internal hemorrhage.

RUPTURED KIDNEY.—Pain and bruise in loins. Blood, and, if an abscess should form, pus in urine. Vomiting, retraction of testicle, numbness of thigh. Less hopeless than injury of the other viscera.

RUPTURED URETER has occurred, causing a large accumulation of urine on the same side of the abdomen : recovery.

RUPTURED BLADDER.—*Vide* BLADDER, RUPTURE OF.

Treatment of Ruptured Viscera.—Perfect rest, warm and moist applications to seat of pain, leeches if pain be severe, opium in small and repeated doses, a minimum diet—starvation if the intestines are believed to be wounded—then give frequent small nutrient enemata. No purgatives. Ice to suck.

Abdomen, Wounds of.—Are either superficial or penetrating. Penetrating are of four classes: 1, without either injury or protrusion of viscera; 2, with protrusion only; 3, with injury and without protrusion; and 4, with both injury and protrusion.

SUPERFICIAL WOUNDS.—*Their Treatment.*—Keep sides in apposition by sutures and a suitable position of the body, but beware of confining blood or discharge. 1, always secure the bleeding-point in severe hemorrhage, enlarging wound if necessary; 2, in slighter hemorrhage do not close wound till bleeding stops; 3, open wound freely at least sign of suppuration. Part of abdominal wall which is wounded is liable to become seat of hernia. Foreign bodies of enormous size may be hidden away in these wounds.

SIMPLE PENETRATING WOUNDS.—Sometimes marked by escape of reddish serum. If sutures should be required, place them close to or through peritoneum, give opium, and apply general principles of practice. *Prognosis* fairly good.

WOUNDS WITH PROTRUSION OF UNINJURED VISCERA.—Cleanse and return protrusion; if necessary, snick edge of wound to make room. Omentum, if much injured, may be cut off after ligaturing. See that the herniated viscera are fairly and entirely passed into abdominal cavity, and not slipped between muscles. Gangrenous bowel: leave it *in situ* to slough, and form artificial anus.

WOUNDS WITH INJURY AND WITHOUT PROTRUSION.—Very serious. Possible escape of urine, fæces, bile, or gas through external wound. Extravasation into peritoneal cavity not invariable. Other *symptoms* and *treatment* like those of contusion of abdomen with rupture of viscera. *Vide* above.

WOUNDS WITH BOTH INJURY AND PROTRUSION.—*Treatment.*—Restrain hemorrhage by ligature or clamp. Do not be anxious to return solid viscera if they are at all seriously injured. Sew up wounds of intestine with silk or strong catgut. Glover's suture, unless the wound be lacerated or involve

much of bowel's calibre ; then stitch bowel to edge of external wound to form artificial anus. Allow no food, except ice and barley-water, for three days. *See also* PERITONITIS (TRAUMATIC), FISTULÆ (GASTRIC AND BILIARY), ARTIFICIAL ANUS.

Abscess.—A circumscribed collection of pus. Two chief kinds, *acute* and *chronic*. Term "*cold*" is sometimes used as synonymous with chronic, and sometimes means a chronic abscess which has formed without any noticeable signs of inflammation.

ACUTE ABSCESS.—*Causes.*—Injury, irritation of a foreign body, follicular obstruction, absorption of poison, especially by lymphatics, and some obscure constitutional conditions. *Symptoms.*—Chills, rigors ; temperature often rises suddenly to 104° . Local symptoms of inflammation. Throbbing pain, which becomes more dull and aching as pus forms. Œdema of skin. Fluctuation. The swelling, which is at first hard, gradually softens in centre. Pointing of abscess : the cuticle rises, the skin ulcerates or sloughs, and bursts. *Terminations.*—1, when opened either surgically or spontaneously, its walls fall together and it closes ; 2, a sinus or fistula remains ; 3, acute abscesses sometimes cause serious mischief by opening into blood-vessels and serous cavities. *Diagnosis.*—An acute abscess can scarcely be mistaken. *Treatment.*—Local rest very important ; general rest in serious cases. Treat cause if possible. Warm moist applications. Quinine internally. Calomel (5 to 10 grains) if the tongue is not clean. *Indications for Opening.*—1, when in sheath of a tendon ; or 2, under strong fibrous membranes ; or, 3, anywhere else where pus is likely to burrow instead of coming to the surface ; 4, near a joint ; 5, under the periosteum ; 6, when pressure is likely to be dangerous ; 7, when it may cause some direct obstruction to some passage ; 8, when caused by some noxious infiltrating fluid, *e.g.*, urine ; 9, when a spontaneous opening would produce deformity, *e.g.*, in neck ; 10, when near anus. *After abscess is open*, employ pressure, if necessary, to prevent fistula ; but poulticing usually suffices as a dressing. *Method of Opening Acute Abscess.*—1, By Paget's or Syme's knife or lancet ; 2, by Hilton's method when deep and in a dangerous situation. "*Hilton's Method.*"—Incise skin and deep fascia, then push a director on into abscess ; lastly, pass a pair of dressing-forceps along director, and when they have entered the cavity, open the blades. Opening to be dependent, parallel with any neighboring important structures, and free.

CHRONIC ABSCESS.—*Causes.*—Dead bone : all causes of acute abscess, *quod vide*. Scrofula. Constitutional debility. *Signs.*—A swelling, at first hard, afterward soft and fluctuating, usually situated near a lymphatic gland, or in some special situation, *e.g.*, in the psoas muscle, or in loose cellular tissue, *e.g.*, that of buttock. Often a certain amount of pain and tenderness ; often evident disease of bone. Pressure on nerves may cause pain or spasm. Abscesses near mucous canals sometimes, but rarely,

become emphysematous. *Course*.—Often very tedious, usually tends to burst, either through skin or into some internal cavity, but usually the former. May remain stationary for years; and may contract while its contents partly degenerate, partly are absorbed. *Constitutional Effects*.—Usually little or none till it opens and its contents are exposed to the air. Then, if the abscess be of any size, decomposition of its contents tends to occur with high fever. *Vide Hectic Fever, Septicæmia, etc.* Liability to burrow, to open into important vessels, and to cause injurious pressure effects. *Diagnosis*.—From, 1, innocent and malignant tumors; 2, aneurisms. 1, in cases of doubt, use trochar, grooved needle, or aspirator. 2, *vide ANEURISM.* *Prognosis* depends upon size, position, age of patient, curability of cause, and upon treatment. Middle age most hopeful. *Treatment*.—Remove cause, *vide CARIES.* If there is no great tensive pain, or if there is no reason to suspect that burrowing is going on, opening may be delayed. An effort may be made to obtain resolution by counter-irritation, iodine, mercurial plasters, and rest. Various modes of opening: 1, by knife; 2, by trochar and canula; 3, aspirator; 4, caustics. Free openings, counter-openings, drainage-tubes, repeated partial evacuations by aspirators, etc. *Antiseptic treatment*, *quod vide.* Dangerous septic symptoms, a probable consequence of prematurely opening a chronic abscess.

PUERPERAL ABSCESSSES occur after parturition; are probably pyæmic in nature. *Locality*.—Iliac fossa, orbit, joints, thigh, etc.

Acupressure.—Four chief modes: 1, a long needle is thrust right through flap and made to bridge over artery; 2, a short needle, with a twisted wire through eye to extract it by, is thrust into soft tissues on each side of and made to bridge over artery; 3, the vessel is compressed between a needle and a loop of wire, like the common hare-lip suture; 4, needle is thrust through soft tissues beside artery, then twisted down upon the artery through an arc of a circle, and thrust into the neighboring soft tissues again. *Advantages* of acupressure.—No foreign body is left in wound more than a day or two, as, after that time, the needles are removed. A few hours suffice for small arteries. Acupressure does capitally in scalp-wounds and when varicose veins burst. *Vide Pirrie's and Sir James Simpson's writings.*

Adenitis.—*Vide GLANDS, DISEASES OF.*

Adenocèle, Adenoma.—Glandular Tumor. A growth, the whole or part of whose structure resembles that of some gland. (But the term "Lymphoma" is usually applied to any tumor resembling lymphatic gland.) When not pure these tumors are called Adeno-sarcoma, Adeno-myxoma, etc. *Occurrence*.—In the "mucous polypi" of the nose, rectum, and uterus, *vide Polypi*; in thyroid gland, *vide Bronchocèle*; in parotid, lips, tonsils, and skin. *Physical Character*.—Movable, rounded, ovoid, or lobulated. Growth, variable in rapidity. *Treatment*.—Divide capsule and

enucleate in suitable cases. Also refer to articles *Polypi*, *Bronchocoele*, *Breast Tumor*, etc.

Amputation.—(When through a joint, it is termed *Disarticulation*.)—*When required.*—For incurable and disabling disease, deformity, or injury of the part; for disease which would take too long time in recovery; to save life when nature would find it easier to heal the amputation would than to cure the disease or injury; for aneurism below or even above the site of operation; for secondary hemorrhage.

General Principles.—1, Remove no more of a limb than is necessary; 2, obtain sufficient coverings for the stump; 3, arrange that the cicatrix shall not lie on the end of the bone; 4, do not take hopelessly unsound tissue into the flaps; 5, take every precaution to check hemorrhage and to prevent its recurrence; 6, cut the large blood-vessels transversely; 7, remember the paramount importance of dressings and after-treatment.

Instruments.—1, Knives appropriate to each case; 2, saw; 3, bone-forceps; 4, lion-forceps; 5, common scalpels; 6, artery-forceps; 7, dissecting-forceps; 8, ligatures; 9, needles and sutures; 10, dressings, sponges, retractors, towels, water, etc.

Assistants.—1, Chief, who sponges, secures arteries, etc., usually stands opposite operator; 2, holds part to be removed; 3, secures main artery, unless tourniquet be used; 4, hands instruments when wanted; 5, chloroformist. Number of assistants of course depends greatly on supply accessible.

Methods.—1, Circular; 2, oval; 3, flap; 4, mixed of skin-flaps and circular cut through muscles.

Steps.—1, Divide soft parts; 2, saw bone (avoid splintering, cut off spicule); 3, tie vessels and trim soft tissue; 4, adjust flaps and insert sutures; 5, apply first dressings.

CIRCULAR AMPUTATION.—1, Sweep through skin and fat and dissect up for half diameter of limb, turning edge of knife slightly away from skin to avoid scoring the vessels which supply the skin-flap; 2, sweep through muscles, “retracting” all the time; 3, still having the muscles well retracted, one or two inches, and having divided the periosteum by a sweep of the knife, saw through bone. Finish as directed above.

OVAL AMPUTATION.—See amputation of finger at metacarpo-phalangeal joint.

FLAP AMPUTATION.—Three varieties: 1, Double Flap; 2, Rectangular (Teale's); 3, One Long Flap.

Double Flap may be lateral, antero-posterior, or oblique. Cut thin flaps from without inward, but thick and fleshy ones by transfixion. Flap containing vessels to be cut last, and vessels cut long.

Rectangular Flaps (Teale's).—All the soft tissues down to the bone included in the flaps. Main artery to be in short flap. Ends of flaps square. Long flap: its length and breadth each equal half the circumference of

the limb. Short flap: its length equals one-fourth that of long flap. Bones sawn exactly at angle of union of flaps, without any retraction.

Spence's Operation (a modification of Teale's).—No posterior flap; retraction instead. Anterior flap simply hangs down over bone.

Lister cuts an anterior rounded flap two-thirds diameter of limb in length; skin and enough muscle to cover bone. Posterior rounded flap (one-third limb's diameter), all skin. Posterior muscles cut as short as possible (to free flaps from effects of their contraction). Retract soft parts for two inches, and saw bone.

Single Flap amputation.—*Vide* amputation at phalangeal joints of fingers.

SKIN-FLAPS AND CIRCULAR INCISION THROUGH MUSCLES.—Cut two skin-flaps by dissecting from without inward. Then finish as in circular amputation.

Hemorrhage during amputation to be prevented temporarily by digital pressure on main artery, by tourniquet, or by Esmarch's bandage.¹ Afterward, ligature by silk, hemp, or catgut—torsion or acupressure is to be employed. Sponging with cold or with hot water to stop oozing.² Actual cautery to check obstinate bleeding from bone.

Muscles retract greatly in traumatic cases, but very little in limbs affected with old disease. *Knife* to be used with a free sawing motion. Parts to be relaxed during transfixion. Commence *sawing* the bone by drawing the saw back to make a groove.

Mortality after Amputation.—1, Chief causes: 1, shock; 2, secondary hemorrhage; 3, pyæmia (in nearly half the fatal cases); 4, erysipelas; 5, phlebitis; 6, congestive pneumonia. Besides which, 7, hospital gangrene, 8, sloughing of stump, and, 9, tetanus, occasionally carry off patient. Pyæmia most common after traumatic, rare after chronic disease cases.

Circumstances affecting Patient's Chance of Recovery.—Two classes: 1, constitutional conditions; 2, circumstances of operation itself. Class 1: age, general health, and hygienic conditions. Child's twice as good as a young man's, three times as good as an old man's. Class 2: seat of amputation, structure of bone sawn through; whether amputation is for injury or disease; nature of the affection; time after the injury. Diseased kidneys, town life, amputation high up a limb, amputation for injury, or through much cancellous tissue of bone—all these darken the prognosis. Nature of disease: after chronic disease, prognosis good; malignant or tuberculous disease, bad; acute suppurative disease of joints, very bad; amputation of expediency, very bad. Time after injury: *primary* or *secondary*. Primary are such as are done within thirty hours of the injury. Secondary are amputations done after suppuration has occurred.

¹ For a *résumé* of the advantages of Esmarch's bandage, see London Medical Record, 1874, p. 271.

² See Practitioner, February, 1879.

Primary always more dangerous than secondary, except in amputations of the upper extremity done in civil practice. Death after primary amputation usually caused by shock, hemorrhage, or exhaustion ; after secondary, by erysipelas, pyæmia, etc.

AMPUTATION AT ANKLE.—*Pirogoff's*.—Resembles Syme's. But the lower incision extends from one malleolus to the other across the sole of the foot, and inclines forward and downward ; while the os calcis is sawn through obliquely, downward and forward, just behind the articular surfaces for the astragalus. The posterior piece of the os calcis is then placed in apposition with the tibia, whose articular surface is previously sliced off. The resulting stump is longer than Syme's ; but if the tarsus is diseased there is a liability to return of the disease in the os calcis.

Syme's Amputation.—Inner angle of incisions is three-quarters of an inch below and behind inner malleolus ; outer angle exactly opposite outer malleolus. Upper incision has an angle of 45° to sole of foot ; lower incision inclines downward and somewhat backward. Os calcis may be dissected from heel-flap either before or after disarticulation at ankle, *i.e.*, either from below or from above. Syme dissected out os calcis from below, and disarticulated afterward. Avoid scoring flap. The anterior tibial and both plantar arteries, and not the posterior tibial, are divided.

ARM, AMPUTATION OF.—*Upper Arm.*—Double flap by transfixion often employed. Also circular and mixed operation. Arteries divided ; brachial, superior profunda, and inferior profunda.

Forearm.—In upper and lower thirds prefer skin-flap and circular through muscles (T. Smith). Arm to be held either supine, or midway between supination and pronation. *Arteries.*—Radial, ulnar, anterior and posterior interosseous.

Elbow-Joint, Disarticulation at.—Seldom done. Best to cut a large anterior flap (Lister).

FINGERS, AMPUTATION OF.—Usually done by disarticulation. To remove the second or third phalanx, cut a single palmar or double (palmar and dorsal) flaps. As the heads of the bones form the knuckles, the articulations are just in front of the knuckles. In case of injury, here as elsewhere, "cut according to your cloth."

Metacarpophalangeal Disarticulation.—So called "oval," really "pyriform" incision. Commence half an inch posterior to head of metacarpophalangeal joint, carry incision right round palmar surface of base of finger and back again. Divide lateral ligaments, twist the bone out of its place and remove it. Extensor tendon should be cut by first incision. Removal of head of metacarpal makes hand more sightly, but much weaker.

FOOT, AMPUTATION THROUGH.—*Chopart's*.—Between scaphoid and cuboid on the one hand, and astragalus and calcis on the other. Long plantar flap, reaching to roots of toes ; very short dorsal flap. Incisions commence, on inner side, just behind prominence of scaphoid ; on outer side, one inch

behind base of fifth metatarsal bone. Beware of opening ankle-joint. Disarticulate before cutting plantar flap. Plantar flap to be longer on inner than outer side. *Arteries*.—Dorsalis pedis, plantar, and digital.

De Lignerolles'.—Removes all the bones of the tarsus, except the astragalus. Heel and dorsal flaps.¹

Hancock's.—Leaves the astragalus and posterior end of os calcis, on the principle of Pirogoff's.

Lisfranc's (commonly called *Hey's*).²—Between tarsus and metatarsus. Long plantar flap, reaching to roots of toes, longer on inner than on outer side. Dorsal incision nearly transverse, with only slight convexity forward. Ends of incisions, on inner side, one inch before tubercle of scaphoid; on outer side, just behind base of fifth metatarsal. In disarticulating, remember dovetailing of second metatarsal bone into cuneiform bones, and the obliquity of cuboido-metatarsal joint. Cut plantar flap from behind forward after disarticulation, but cut its borders deeply down to bone when commencing operation. *Arteries*.—Dorsalis pedis, plantar, and digital.

HAND, AMPUTATION THROUGH.—Not a single bone should be unnecessarily removed. The flaps have usually to be taken from where soft tissues are most available.

HIP-JOINT, AMPUTATION AT.—Three ways: 1, long anterior flap; 2, double flap, anterior and posterior; 3, lateral flaps. Use Lister's tourniquet for aorta, or Davy's lever per rectum; let patient's buttocks project beyond edge of table, tie body and sound limb to table, have three assistants, and stand on left side of limb. Assistants: 1, takes charge of flap and pays greatest attention to instantly stopping all hemorrhage; 2, manipulates limb: he has mainly to prevent locking of operating-knife, especially by keeping great trochanter out of the way; 3, controls tourniquet.

Long Anterior Flap Operation.—Left hip: transfix from a point midway between ant. sup. spine of ilium and great trochanter to another point just in front of tuberosity of ischium. Knife should pass behind femoral vessels and lay open hip-joint. Right hip: transfix in the same way, but in the opposite direction. Other operative procedures same for both right and left limb. Length of flap, eight or ten inches. Next, draw knife across capsule of joint, opening it freely. Divide ligamentum teres and external rotators. Cut vertically downward through remaining soft parts.

Manipulations by Assistant having Charge of Limb.—1, while anterior flap is being formed, flex slightly, adduct, and rotate inward. Then extend and rotate outward, till, the ligaments being divided, head of femur leaves its socket with a sucking noise. Then, again slightly flex, adduct, and extend forcibly. Absence of posterior flap favors drainage. *Arteries*.—Femoral, profunda, obturator, sciatic and minor branches.

¹ Highly praised by Nélaton.

² Hey's operation differs from Lisfranc's in that the former saws through the second metatarsal bone.

Double-flap Amputation.—Manipulations and proceedings resemble preceding; but there are two flaps: anterior, five inches; posterior, four inches long. In cutting posterior flap, have limb rotated inward to clear great trochanter.

Lateral Flaps.—External is composed of skin. Internal, of skin and muscle, is cut from within outward. Angles, where flaps join, are: in front, just outside femoral vessels; behind, close to tuberosity of ischium.

When done for injury, amputation at hip-joint is almost always fatal; when for disease; three recover out of five.

KNEE-JOINT, DISARTICULATION AT.—Chief methods: 1, anterior skin-flap; 2, antero-posterior double flaps, either the anterior or the posterior being the longer; 3, long posterior flap (usually including flesh); 4, lateral skin-flaps; 5, anterior and posterior skin-flaps, with circular incision through muscles. The patella is generally left; then the tendon of the quadriceps extensor may be divided. Incisions in lateral flap method begin one inch below tubercle of tibia. Flaps to be somewhat square. Cartilage to be left, unless diseased. *Mortality.*—For disease, one in three.

LEG, AMPUTATION OF.—Any one of the ordinary methods can be used; but double skin-flaps and circular through muscles are very good. Care should be taken not to lock the knife between the two bones, and not turn its edge upward in cleaning between the bones. The sharp anterior edge of the tibia should be bevelled off with the saw. Sawing through the fibula should always be completed before the division of the tibia. *Mortality.*—For disease, one in twelve; for injury, 60 per cent.¹

PENIS, AMPUTATION OF.—Clover's clamp or tape to check hemorrhage. Corpus spongiosum to be cut half an inch longer than C. cavernosa. Value of galvanic cautery ecraseur. Urethra to be split into three and sewn to skin. Skin to be divided higher up than the "corpora," *i.e.*, the very reverse of the principle adopted in amputating a limb.

SHOULDER-JOINT, AMPUTATION OF.—Three chief methods, viz.: 1, lateral flaps; 2, anterior and posterior flaps; 3, oval incision. But, in cases of extensive injury to upper arm, almost any operation may be expected to give a satisfactory stump.

Lateral Flaps.—Transfix in cases of injury. Cut from without inward when for disease. Knife, narrow-bladed. Three assistants: 1, holds the limb; 2, raises the flap; 3, follows the knife as it cuts behind the humerus, and grasps the inner flap with the axillary artery. Subclavian may be compressed. Position of operator: for right limb, stand before; for left limb, stand behind. Right side: enter knife midway between acromion and coracoid process. Left side, enter well behind spine of scapula, at

¹ These statistics of amputations are average, and, of course, differ from those of some exceptionally successful surgeons. Moreover, surgical operations have been steadily increasing in safety for years, thanks to Lister and others.

posterior border of axilla. Outer flap should contain most of deltoid. Secondly, open capsule, divide muscles attached to great tuberosity (arm rotated inward) and subscapularis (arm rotated outward). Thirdly, having dislocated head of humerus, pass knife behind it and cut down for a distance of three inches, keeping close to inner side of bone (so as not to divide artery too soon). Then complete inner flap by turning edge of knife inward and cutting through. *Arteries*.—Axillary, circumflex, subscapular, etc.

Oval Amputation.—When uncertain whether to resect joint or amputate, perpendicular incision may be made as for resection (*quod vide*), and the joint examined. Then, if desirable, the limb can after all be removed by cutting obliquely right around the limb from and to the lower end of the longitudinal incision. This is Spence's plan.

Mortality.—For disease, one in two; for accident, one in three.

THIGH, AMPUTATION OF.—*Methods*.—1, Gritti's; 2, Carden's; 3, Spence's; 4, lateral flaps (Vermale's); 5, circular; 6, double flap by transfixion; 7, mixed; 8, Teale's.

Gritti's.—Done "just above condyles with an anterior flap, in which the patella is preserved, its surface being sawn and applied to the cut surface of the femur." Incision extends from upper end of fibula to inner side of joint, reaching downward below patella.

Carden's.—Through the condyles. Single anterior flap. Circular cut through deeper parts. Slight retraction of them before sawing bone.

Advantages.—The medullary canal not being opened, there is less risk of pyæmia. The skin of knee is accustomed to bear weight of body in kneeling, etc. *Arteries*.—Popliteal and some of its branches.

Spence's.—Long anterior; no posterior flap; circular cut through muscles; retract two inches and saw bone.

Lateral Flaps.—Not to be recommended. This operation and the other modes of amputating thigh all done in the ordinary way. *Arteries*.—Femoral, profunda, external circumflex, anastomotica magna if flap reaches low down, muscular branches.

Mortality of Amputation of Thigh.—After injury, three in five (much more in military practice); after disease, one in three. But, for chronic knee-joint disease, it is particularly safe.

THUMB, AMPUTATION OF.—1, At *Carpo-metacarpal Joint*.—Incision along dorsum of metacarpal bone, commencing at palmar side of trapezio-metacarpal joint, and ending at web of thumb. Flap from ball of thumb, by transfixion. Right thumb: transfix first. Left thumb: transfix after making dorsal incision. Operator should stand beside the hand or forearm, not in front of it; otherwise his own left hand will get in his way. Beware of locking knife under sesamoid bones; and keep close to metacarpal bone, to avoid wounding radial artery. *Arteries*.—Dorsales and arteria magna pollicis.

2, *Thumb at Metacarpo-phalangeal Joint*.—Oval amputation.

TOE, GREAT.—At *Tarso-metatarsal Joint*.—Two methods, flap and oval.

1. *Flap*.—Cut a flap from whole length of inner side of metacarpal bone. Better not transfix for this. Then transfix between first and second metacarpals, and cut downward right through web of toes. If possible, save base of metacarpal bone; otherwise divide tendon of peroneus longus and disarticulate. Beware of sesamoid bones, and of dividing communicating branch between dorsalis pedis and external plantar artery at base of interosseous space. *Artery divided always*.—First digital.

2. *Oval Amputation*.—Commence incision half-an-inch posterior to where the bone is to be divided or disarticulated.

TOES.—Amputated in same way as fingers.

Anæsthesia.—The term usually applied to the production of insensibility to pain for surgical or medical reasons. This state is induced for five purposes: 1, to relieve the pain of operations or examinations; 2, to facilitate such proceedings as the reduction of dislocations and herniæ; 3, where spasm interferes with diagnosis; 4, where hysteria or malingering is suspected; 5, as a curative agent, *e.g.*, in puerperal convulsions.

Anæsthetics are either general or local. General anæsthetics in ordinary use: 1, chloroform; 2, ether; 3, a mixture of chloroform, ether, and alcohol; 4, bichloride of methylene; 5, nitrous oxide gas.

Their physiological action consists in paralyzing temporarily almost all the nerve-centres, except those necessary to maintain life.

Advantages and Disadvantages peculiar to Each.—Nitrous oxide is the least dangerous, but it is inconvenient for long operations. It is, *par excellence*, the anæsthetic for short operations. Bichloride of methylene has a quick action and causes little vomiting. Recovery is rapid; but it is more dangerous than ether, and perhaps as dangerous as chloroform. It is used in ophthalmic surgery and for ovariectomy. Chloroform has a quick and powerful action, is comparatively agreeable to take, and seems safe enough for children; but, for adults, is more dangerous than ether. It frequently causes vomiting. Ether is safe and powerful, and not much slower than chloroform when properly given. On the other hand, the patients sometimes require strong assistants to manage them in the stage of excitement; and in old bronchitics bronchial irritation is produced. As air should not be mixed with ether, it is not adapted for operations about the mouth. The mixture of alcohol, chloroform, and ether is much liked at Guy's Hospital. (Chloroform has been said to be quite safe for parturient women, but several deaths have been recorded.)

Modes of Administration.—Always see that all buttons and braces about neck and chest are loose. In bloody operations about the mouth the patient should sometimes be turned on his side. Prone position permissible if required. Carefully watch respirations and pulse, especially the former.

1. *Chloroform*.—Recumbent position. Clover's inhaler. Other inhalers. Piece of lint. Towel. Allow free access of air. Commence gently. Pour 3 ss. upon the towel to begin with.

2. *Ether*.—Best administered in a towel folded conically with a sponge at the bottom, or in a cone of mackintosh lined with felt. Two ounces are not too much to begin with, and the drug should be administered boldly, especially in the stage of excitement. If the drug be pushed vigorously then, complete anæsthesia usually follows immediately; if indecision or timidity be displayed, the patient's struggles last a long time. No air should be allowed to get under the apparatus, which should be held firmly down over mouth and nose. Patient may pull it off, unless assistants are arranged before commencing so that they may be ready to restrain the patient the moment restraint is necessary. $\frac{3}{4}$ j. of ether is to be put into the cone from time to time. The patient's face is red and congested, and his breathing apt to be stertorous. Much saliva is secreted.

2A.—It is an excellent plan to administer, successively, nitrous oxide and ether, a mixture of the two, and lastly ether alone. Mr. Clover has contrived an apparatus which answers this purpose admirably. No stimulant should be given before administering ether. Pure anhydrous, washed ether always to be used. Robbins' ether for local anæsthesia is dangerous.

3. *The Mixture*, of alcohol 1 part, chloroform 2 parts, and ether 3 parts, is to be given like chloroform; but the air should not be allowed to mix quite so freely with the vapor (?).

4. *Bichloride of Methylene*.— $\frac{3}{4}$ j. is placed in Rendle's apparatus. This is a cone of leather lined with flannel, has small perforations at the apex, and is held close over the mouth and nose, as in giving ether. If a second drachm is afterward used to prolong the anæsthesia, the effects resemble those of chloroform.

5. *Nitrous Oxide Gas*.—Is given perfectly pure, from a bag, which is replenished from an iron bottle, which contains the gas compressed to a liquid state. The appearances produced are somewhat alarming, for the blood is temporarily "unoxxygenated," like venous blood. But this is not really dangerous.

Causes of Danger from Anæsthetics.—1, sudden stoppage of respiration, either from paralysis of nerve-centre, or from mechanical obstruction, e.g., falling back of the tongue, or passage of blood into larynx; 2, sudden paralysis of the heart. But it would appear that heart disease does not contra-indicate anæsthetics; and ether is a powerful cardiac stimulant; 3, shock.

Precautions.—1, Do not push the anæsthetic too much at first. Be careful about the quantities used; 2, allow plenty of air with chloroform; 3, recumbent position, especially with chloroform, though not required with gas; 4, loosen all tight coverings on chest and neck; 5, have ether of the right quality; 6, it should be possible to let a free supply of fresh air

into the room if necessary ; 7, administrator should confine his attention to the administration only ; 8, he should carefully watch the pulse and respiration—the former most closely with chloroform, and the latter with ether.

Treatment of Dangerous Symptoms.—Pull the tongue out of the mouth. Clear the throat out if there be any suspicion that blood or vomited food is obstructing the larynx. This failing, tracheotomy may be found justifiable. Artificial respiration. Galvanism : one pole on the throat near the phrenic nerve ; the other in pit of stomach. Hot affusion to head. Perpendicular position, with head downward. As much fresh air as possible.

LOCAL ANÆSTHETICS.—Extreme cold produced : 1, ice and salt ; or, 2, ether-spray. Use twice as much powdered ice as salt, in a gauze bag. Useful for small operations on the skin or about the nails, excision of small epitheliomata, etc.

Aneurism.—A considerable dilatation of an artery, or any hollow tumor communicating with the interior of an artery.

Classification.—According to the relation of its sac to the wall of the artery, into : 1, true ; 2, false ; and 3, dissecting aneurism. According to its shape, into fusiform and sacculated. And, according to its apparent cause, into spontaneous and traumatic. Cirroid aneurism and varicose aneurism not usually included in this classification.

A *true* aneurism used to always mean one whose sac consisted of all three arterial coats. The term, rarely now used at all, often means merely that the sac is formed chiefly by the wall of the artery. *False*, in the same way, may mean either that the sac is wholly, or that it is chiefly, formed of tissues outside the artery. *Dissecting* aneurisms are formed when the blood burrows between the coats of an artery.

Causes.—Dilated arteries are almost always found to be atheromatous (vide *Atheroma of Arteries*)—1, occupation : soldiers, sailors, employments where severe and prolonged efforts are required irregularly. Soldiers are chiefly liable to thoracic, sailors to subclavian and axillary aneurisms (probably from climbing, etc.) ; 2, abuse of alcohol ; 3 syphilis : the liability of soldiers is partly attributed to the latter two causes, and partly to the strain on the thoracic organs, caused by the old-fashioned stock and knapsack ; 4, strains ; 5, age : very rare in childhood, commonest between thirty and forty ; 6, *traumatic* aneurisms are caused by direct wounds.

Pathology.—An idiopathic aneurism begins by the dilatation of a diseased part of the wall of some artery. The whole wall may be so softened as to dilate ; but usually the inner coat is ulcerated, and then, from the first, the aneurismal sac consists only of the outer and part of the middle arterial coat. But always, before the tumor reaches the size of an average orange, all trace of distinction between the arterial walls and the surrounding tissues is lost in its sac. In the meantime, wherever the inner

coat of the artery is absent, the blood tends to deposit layer after layer of fibrin: the outer layers, after a time, have become organized and pale, while the inner are still soft and dark-colored. Fusiform aneurisms have the inner coat of the artery most sound, and only a few shreds of fibrin adhere to their walls. The wall of an aneurism itself tends to thicken and strengthen. Adjacent parts are pressed upon, nerves are irritated or paralyzed, ducts obstructed, bones absorbed.

Symptoms.—Patient generally applies for advice either because of the swelling, or of the pain caused by the pressure of the tumor; but the earliest symptoms are generally those of slight muscular weakness of the limb. Tumor, in the course of some artery, soft at first, harder as it progresses. Pulsation, expansive. Bruit, loud and rasping, or soft, or altogether absent. Pulse below aneurism weak. Often cedema, neuralgia, spasm or paralysis from pressure on veins or nerves. Compress artery above, tumor less tense or smaller; compress artery below, tumor may become larger or more tense. The tumor can often be partially emptied by pressure.

Diagnosis.—May be confounded with tumors, or abscesses in the course of large arteries; malignant tumors of bone; or mere enlargement and relaxation of the artery. It is always to be borne in mind that the pulsation of an aneurism is heaving, while that of a vascular tumor is usually sudden and more abrupt; also, that aneurisms do not always pulsate,¹ and that when an aneurism is emptied by pressure, it gradually returns to its full size. *Diagnosis from Tumors and Abscesses pressing on the Artery.*—1, such swellings mostly have no bruit; 2, their pulsation is an equable rise and fall, and not expansive; 3, an abscess probably shows signs of suppuration (but an aneurism may suppurate too); 4, the tumor can often be dragged off the artery which communicates to it its pulsation.

Diagnosis from Pulsatile Tumors of Bone.—1, Bruit in pulsatile tumor rarely so well marked, and often absent; 2, pulsation more sudden and less expansive; 3, signs are often to be found in the state of the neighboring bone: thus, a plate of bone may be felt in the tumor. Pulsatile tumors may dilate the bone: aneurisms cut a clean hole through bone; 4, these tumors being almost always cancerous, may be accompanied by other signs of cancer. *Diagnosis from Aneurismal Dilatation.*—By the absence of all marked symptoms of a genuine aneurism.²

Prognosis.—Spontaneous cure does sometimes occur, but very rarely. Without treatment a fatal event from bursting of the sac is to be expected. With treatment the patient's chance depends mainly on the situation of

¹ For diagnoses, etc., of aneurisms which do not pulsate, see Holmes, in *British Medical Journal*, Jan., 1880, and Marrant Baker, in *St. Bartholomew's Hospital Reports*, 1879. Auscultate and observe the effect of pressure on the main artery.

² From Holmes's *System*, vol. iii., p. 455.

the aneurism, partly on its cause, the fitness of the case for operation, and on whether the aneurism be single or multiple.

Course.—Enlargement in size ; formation of layer after layer of coagulum ; absorption, first of adjacent parts, and next of the aneurismal sac itself. Then one of the following terminations :

Terminations.—1 (most common), rupture of sac and death ; 2, escape of piece of clot, embolism beyond aneurism, and spontaneous cure ; 3, suppuration of sac ; 4, flow of blood through aneurism checked by its own growth and pressure on artery above ; 5, coagulation may go on to so great an extent as to fill sac with fibrinous laminae, and stop pulsation and further enlargement ; 6, the condition may remain stationary. All these events, except the first and sixth, may cause spontaneous cure. But the third may cause fatal hemorrhage. Aneurisms burst through serous membranes with a large opening, causing instant death ; but through mucous membrane and skin with a small opening, so that death is preceded by several hemorrhages.

Treatment.—Classified into internal or medical, and external or surgical. Every method aims at producing a clot which shall stop the growth of the aneurism, excepting the method of Antyllus. *Surgical treatments* are : 1, ligature (Anel's, Hunter's, and Brasdor's operations) ; 2, pressure (instrumental and digital) ; 3, flexion ; 4, use of Esmarch's bandage (Reid) ; 5, acupressure and temporary ligature ; 6, manipulation ; 7, galvano-puncture ; 8, coagulating injections ; 9, wire in the sac.

Ligature—Method of Antyllus.—Operation.—Command artery above aneurism. Open sac and turn out clots. Find the arterial orifices opening into it, and tie the artery above and below aneurism, controlling hemorrhage in the meantime by pressure with the fingers. When suitable : 1, in gluteal aneurisms ; 2, axillary aneurisms ; 3, traumatic aneurisms at bend of elbow ; 4, when an aneurism has been opened accidentally ; 5, when the sac has burst.

Hunterian Operation.—Artery tied at point of selection above aneurism.—Operation.—Instruments: scalpel, forceps, retractors, artery-forceps, ligatures, aneurism-needle, etc. Observe landmarks, incise or separate structures to expose sheath of vessel, make a very small opening in the sheath, gently separate artery from sheath at point selected. Pass aneurism-needle from the side where vein lies. The great advantages of Hunter's operation are that artery is most likely to be healthy, and certain to be accessible, at the part chosen.

Anel tied the artery immediately above the aneurism.

Brasdor's Operation.—Artery tied on the distal side of aneurism. Chiefly applicable to carotid in aneurisms at root of neck.

Pressure.—Either (1) direct, *i.e.*, upon the aneurism itself—very unusual ; or (2) upon the artery. Effected either by the fingers or by mechanical contrivances, *e.g.*, Carte's tourniquet, or P. H. Watson's weight com-

pressor. The treatment by Esmarch's bandage should be classed as a treatment by pressure. Under anæsthesia almost any aneurisms, except the thoracic, may be treated by compression; and certain thoracic aneurisms might, perhaps with advantage, be treated by distal compression of the carotid, etc., on the principle of Brasdor's operation. Statistics of results much better than those of ligature. But prolonged, unsuccessful compression sometimes appears to make worse the prognosis of a subsequent operation for ligature.

Prepare the patient by rest in bed and limited diet (both as to fluids and solids). Chloral if necessary. Bandage limb, shave seat of pressure and dust it with hair-powder. If pressure be instrumental and there be room, apply two instruments to the artery and use them alternately. Keep bed-clothes well off the tourniquets. Patient may sometimes be instructed to manage his own treatment. Anodynes if necessary. Use the minimum pressure absolutely necessary to check the flow of blood. Keep it up continuously, even during sleep, if the patient can be got to bear it. In compressing the abdominal aorta or the iliacs, it is best to produce anæsthesia and keep it up for hours. Aneurisms may thus be cured by one spell of compression.

Digital compression requires relays of assistants. A weight should be suspended so as to press down on the assistant's fingers, and supply the compressive force. Duration of pressure treatment very variable—often a month; in some cases cure has resulted in a few hours.

Many valuable papers on, and cases of treatment of aneurism by compression, are to be found in the *Dublin Medical Journal*.

3. *Flexion*.—Especially applicable to aneurisms situated in the flexures of joints, e.g., popliteal, and on the superficial aspect of the artery. Bend the limb, not too acutely at first, and fix it thus with straps, buckles, or bandages. Rest in bed and restricted diet as accessories. Slight simultaneous compression of artery above sometimes advisable. (See Ernest Hart: "Medico-Chirurgical Transactions," vol. xlii., p. 405.)

4. *Esmarch's bandage* should be applied under anæsthesia, and may be kept on for two hours or more. But one application for one hour has sometimes been found quite sufficient. (Dr. W. Reid, R.N.)

NOTES ON SPECIAL ANEURISMS.—*Aorta, Aneurism of—Thoracic*.—See medical works. Usually treated by rest and restricted diet (Tufnell's treatment). Galvano-puncture and distal ligature (i.e., of the carotid) have both been employed beneficially.

2. *Abdominal Aneurism*.—May be either of aorta or of one of its branches. Diagnose from "hysterical pulsation," from pulsating cancer, and from abscess. In hysterical pulsation there are no true aneurismal bruit and no tendency to progress, but there are concomitant signs of nervous disorder. The other sources of error may be avoided by applying general principles, and watching a doubtful case for a short time. *Treatment* must

generally be medical; but success has attended compression of abdominal aorta under anæsthesia for several hours (Murray: "Medico-Chirurgical Transactions," vol. xlvii.). Directions for tying the iliac arteries will be found under *Arteries*.

Axillary Aneurism.—Generally treated by ligature of subclavian (third part). Compression of subclavian. Operation of Antyllus recommended by Syme.

Carotid Aneurism.—Commonest seat—bifurcation of common carotid. When seated at root of neck, tie distally (Wardrop's and Brasdor's operation).

Femoral Aneurism.—Comparatively common, and admirably suited for treatment by compression. If ligature is resorted to, external iliac must be tied for aneurism of common femoral.

Gluteal Aneurism.—Usually traumatic, and singularly liable to be mistaken for abscess. Suitable cases for such treatment as galvano-puncture. "Many cases, I have no doubt, might be cured by compression of the aorta or common iliac artery under chloroform."—Holmes. Compression per rectum might be also suggested. See also Holmes, *Lancet*, July 11, 1874.

Orbital Aneurism.—Usually common aneurism, but very exceptionally "cirroid." *Symptoms*.—Besides pulsation, there are displacement of the eyeball and loss of sight. *Treatment*.—Spontaneous cure possible. Compress carotid digitally. Other treatment dangerous, but may be unavoidable. Ligature would have to be applied to the common carotid. Refer to Rivington: "Medico-Chirurgical Transactions," vol. lviii.

Subclavian Aneurism.—Ligature of the innominate and of the first part of the subclavian artery have been always fatal, excepting in one case. Therefore, subclavian aneurism is best adapted for the diet and rest treatment, or for galvano-puncture, or for manipulation. Amputation at the shoulder-joint is in some cases justifiable. Willett has suggested a combination of amputation at the shoulder-joint with ligature of the carotid.

Ankle-Joint, Disease of.—Swelling causes prominence of and fluctuation beside extensor tendons. Diagnose from disease of tarsus. In the latter case there is free movement at the ankle under anæsthetics. Prognosis is the more favorable because general exercise can be combined with local rest.

Ankylosis.—Three kinds: 1, *extra-articular* fibrous; 2, *intra-articular* or ordinary *fibrous* or *false* ankylosis; and 3, *bony* or *true* ankylosis. In the first case there are not, in the second there are, fibrous bands within the joint. First case results from inflammatory thickening of surrounding parts, contracted ligaments and tendons, etc. Often there is a combination of all three. *Diagnosis*.—In osseous ankylosis there is no motion whatever; in intra-articular fibrous there is some motion, which is checked more abruptly than in extra-articular. Anæsthetics may be required. Sayre tries to move the joint vigorously for two minutes under chloroform.

If, within twenty-four hours, any swelling result, the ankylosis is, of course, not bony. *Causes*.—Joint-disease, etc. Osseous ankylosis usually caused by traumatic disease. *Treatment*.—1, Preventive: proper passive motion applied in time. If ankylosis is inevitable, select the best position; 2, Curative:

1. **FIBROUS ANKYLOSIS**.—Passive motion, friction, douches, steam-baths, screw-splints, weights. Anæsthetics: subcutaneous rupture. Take a short hold (near the joint), and try to rupture by flexion. Tenotomy. Division of tight fascia.

2. **OSSEOUS ANKYLOSIS**.—Do not interfere, if possible. Fresh disease may be excited, or the operation may be fatal. "Subcutaneous resection." Sawing, drilling, fracturing; cutting out wedge-shaped piece of bone; fracturing shaft of bone just below joint. Little more than a good position usually aimed at.

Antiseptic Treatment, The.—Almost always means Lister's method only. *Principles*.—1, an open wound does worse than a subcutaneous wound, because atmospheric germs enter it and produce fermentation, resulting in irritation, decomposition, etc., which again lead to inflammation, blood-poisoning, etc.; 2, certain substances, *e.g.*, carbolic acid, destroy these germs. *Details*.—Spray, carbolized instruments and hands, carbolized catgut, protective next wound, gauze (usually eight folds), mackintosh just beneath uppermost layer of gauze. Sometimes use a drainage tube, then its end must be well concealed by gauze. Carbolized bandage, elastic bandage in certain cases, safety-pins. *Explanation of details*.—Spray (strength 1-40); carbolizing the hands, etc., prevents access of live germs; protective protects from the irritating properties of carbolic acid; gauze absorbs and disinfects discharge; mackintosh prevents discharge from soaking through to the surface, and thus establishing a channel of disinfection. Lotion for washing instruments, etc. (strength 1-40). Dressing should be removed under spray and redone from time to time, according to amount of discharge, which should not, if possible, be allowed to soak quite through. In absence of spray-producer, and in the case of accident wounds, wash the surfaces with lotion (1-40). Antiseptic "veil" and irrigation, substitutes for spray. Boracic and salicylic acid, thymol, and ol. eucalypti have been used instead of carbolic acid. Strength of lotion for use in steam spray-producer, 1-20; steam dilutes it to 1-40.

Antrum, Diseases of, may be classified into Cystic Disease of, Suppuration in, and Tumors of Antrum.

ANTRUM, CYSTIC DISEASE OF.—Firstly, there is the form known as *Dropsy of the Antrum*, not owing to obstruction of antro-nasal orifice, but to cystic disease of the mucous membrane; simple or multiple cysts; bulging into nose, mouth, orbit, and cheek; thinning of bone, even to crackling. Contents: thin, brownish, serous, with cholesterine. *Treatment*.—Catheterize through nose, or tap through anterior wall from mouth, or draw a diseased

tooth and tap through its socket. Restore shape of cheek by pressure with a pad. A second variety, called "*Dentigerous Cysts*," connected with misplaced teeth. Small ones common. Large ones cause absorption of neighboring parts. *Treatment*.—Open and remove the contained teeth; stuff cavity with lint till it begins to granulate. If cyst be large, remove part of its wall.

ANTRUM, SUPPURATION OF.—*Causes*.—Carious teeth, blows. *Signs*.—Swelling, pain, puffiness of neighboring soft parts; perhaps escape of pus into nose. *Treatment*.—Remove the offending tooth and perforate through its socket, or extract second molar, or perforate canine fossa with a carpenter's gimlet. Wash out with Condy or carbolic lotion. Keep a free exit for the pus. Restore symmetry by pressure.

ANTRUM, TUMORS OF, include, strictly, above-mentioned cysts; also fibrous, sarcomatous, osseous, cartilaginous, fatty, erectile, and carcinomatous (epithelial and encephaloid); fourth, fifth, and sixth kinds very rare. *Diagnosis* practically has only to be made between (1) simple and (2) malignant disease; or between (1) malignant and within the antrum, and (2) malignant and extending beyond the antrum. If an operation is proposed, it should also be determined, if possible, where the tumor began, *e.g.*, behind the antrum or not. In doubtful diagnosis from cysts, determine by perforation. *Malignant* tumors (1) grow rapidly, (2) early affect submaxillary glands, (3) protrude early into neighboring cavities, forming a fungus. *Point of Origin*.—Tumors of malar bone spread over upper jaw; intra-antral tumors expand it on all sides; post-antral tumors push it bodily forward without distorting it. *Treatment*.—Operative or palliative. *Question of operation*.—If the soft structures of the cheek are not freely movable over the tumor, and if the glands are affected, do not operate; nor if disease be malignant, advanced, and post-antral in origin. In simple disease remove no more of the maxilla than the side diseased. For the operation, *vide Excision of Upper Jaw*.

Anus, Artificial.—See *Colotomy*.

ANUS, CANCER OF, usually spreads from rectum. If primary, commonly epithelioma. May be excised at first. See Cripps on Cancer of Rectum.

ANO, FISTULA IN,—*Causes*.—It is the sinus left by an ischio-rectal abscess, *quod vide*. *Varieties and Signs*.—Complete and incomplete, former opens both inside and outside anus; blind internal and blind external. Sometimes there are several openings; outer opening usually within one inch of anus; granulation often projecting from it; course of fistula feels hardened and thickened; purulent discharge; tenderness; history of former abscess; constitution often phthisical. *Prognosis*.—Permanent cure difficult if the openings be numerous and phthisis coexist. Ordinary cases easily remedied. *Treatment*.—Introduce first a probe, then a director. Make blind fistula complete. Then slit up, on the director, the bridge of skin and sphincter covering fistula. Precede operation with a

purge and an enema. Dress with oiled lint, pad, and T-bandage. Check severe hemorrhage with styptics and pads. Galvanic cautery. Ligature. Elastic ligature. Coexistence of phthisis does not usually contraindicate operation.

ANUS, FISSURE OF, usually accompanied by **ANAL ULCER**. *Causes*.—Female sex: debility, cachexia, dirty habits, eczema. *Signs*.—Burning pain after defecation, sometimes lasting for hours; seat of pain, chiefly sacro-iliac articulation; genito-urinary irritation; purulent, bloody and mucous exudation; patient feels and looks worn and despondent; on examining anus carefully (a speculum may be required), one or more small ulcers or fissures seen, generally very tender; sphincter very irritable and spasmodic; ulcer usually near coccyx and just within anus. *Treatment*.—Cleanliness; soap and water; zinc ointment; glycerine of tannin; nitrate of silver; anodyne and astringent suppositories; division of ulcer or fissure and superficial fibres of sphincter to depth of one-eighth of an inch. Rest in bed for some time after operation.

ANUS, IMPERFORATE (including congenitally malformed rectum).—Six kinds. **Case 1.** Congenital narrowness of anus. *Treatment*.—Notch and introduce sponge-tents. **Case 2.** Complete closure of anus; rectum normal. *Treatment*.—Crucial incision; no plug required. **Case 3.** Closure of rectum by a membranous septum; anus normal. *Treatment*.—Pass an ear-speculum up to the septum; pass a tenotomy-knife through speculum, and, cutting in the median line, with an inclination toward the sacrum, divide the septum. **Case 4.** Complete absence of anus. **Case 5.** Absence of a considerable part of the rectum; often a fibrous cord instead. *Treatment*.—In Cases 4 and 5 an attempt may be made to dissect up to the rectum as follows: *Operation*.—Keep in mind small size of pelvis and relations of bladder and internal iliac vessels; empty bladder; incise exactly in the position of the anal depression; crucial incision; cut beyond the posterior margin of the depression; cut deeply with first incision; introduce finger with the point upward and backward. Generally the cul-de-sac of the bowel can be felt when the child cries, or when the abdomen is pressed upon by the assistant. Puncture upward and backward; enlarge with probe-pointed bistoury; bring mucous membrane of gut down to external wound, if possible; keep open at first with a suppository. If the operation fails, never plunge a sharp instrument blindly into the pelvis, but perform Littré's operation. *Vide Colotomy*. **Case 6.** Rectum may communicate with or open into vagina, bladder, or urethra. *Treatment* for Case 6.—Plastic operation; operation for artificial anus; or nil. Colotomy sometimes causes a mere communication to close up, and all the feces to pass per anum.

ANI, PROLAPSUS, is really a prolapse of rectum, usually of its mucous coat only. *Causes*.—Constitutional weakness. Rectal, genital, and urinary irritation causing straining. Piles. Polypi, urinary calculi, worms,

phimosis, constipation. Age of childhood. *Signs*.—Protrusion of a ring of mucous membrane, becoming dark and turgid if allowed to remain prolapsed. Strangulation, suppuration, and even mortification may occur. *Treatment*.—Reduce prolapse at once. Regulate bowels; mild aperients, Friedrichshall water, “effervescing citrate of magnesia.” Recumbent position after, or even during defecation. Astringent injections, alum, tannin, iron. Tonics, iron, strychnia. Always seek for and remove cause. In bad cases, ligature parts of the prolapsus, or paint it with strong nitric acid, bathing afterward in cold water. Incise freely a strangulated prolapsus. Children should have one buttock pulled to one side obliquely during defecation. This causes a tight fold of skin to support anus.

Arteries, Atheroma of.—Term applied to the effect produced on arteries by a chronic or subacute inflammation. *Causes*.—In many cases, unknown. Alcohol, syphilis. Common in advanced age. Atheroma is common where an artery pulsates against a bony surface (A. Barker). *Signs*.—During life such arteries as the radial and temporal are often found hardened and even looped. Liability to aneurisms and rupture of the arteries. *Pathology*.—Begins by a deposit of cells in the inner, where it joins the middle coat. This inflammatory new formation takes one of three courses: either (1) it softens down into molecules and fat and causes an ulceration of the tunica intima; or (2) it organizes into a fibrous thickening; or (3) it undergoes a calcareous degeneration. It is in the first case that aneurism is most likely to occur. In the smaller vessels it is the muscles which ossify. When the disease attains a high grade, the arteries bulge out, various stages found together at same time. In the smallest arteries the process affects chiefly the adventitia. In the largest arteries (which are almost void of muscle) it affects almost entirely the intima. Atheroma pulp consists of molecular and fat granules, cholesterine, crumbs of carbonate of lime, and hæmatoidin crystals. *Effects of Atheroma*.—Secondary hemorrhage. (Acupressure recommended for atheromatous arteries.) Gangrene. Aneurism.

ARTERIES, LIGATURE OF.—Arteries are tied either in the continuity or at a point wounded or severed. 1. *Ligature in the Continuity*.—Operation generally done at a point selected, because, 1, it is not too near a diseased part of the vessel (*e.g.*, an aneurism); 2, it is not so far off an aneurism that collateral circulation would at once nullify the operation; 3, it is not close to the origin of a large branch, the rush of blood through which would prevent coagulation and cause secondary hemorrhage. *Operation*.—Learn well the superficial and deep landmarks, and the anatomy of the part. Mark out the vessel's course. Incise the skin and superficial fascia equally and sufficiently. A director may be used for the deep fascia. Avoid superficial veins; avoid opening sheaths of muscles. “The surgeon should not at the commencement occupy himself with looking for the artery, but should seek the first marked point of guidance, then the

second, then the third, and so on to the end" (Bryant). Handle of knife will push muscles, etc., aside. Retractors. Feel artery pulsate. Opening in sheath to be small, and made with knife-blade held on a plane just superficial to the artery, that is, "on the flat." Insinuate aneurism-needle round artery. Draw out ligature with forceps. In tying, press down knot with tips of forefingers; do not lift vessel from its bed. Cut one end of a silk ligature short, and both ends of a catgut one. Close wound and dress. Before actually tying ligature, make sure that you have surrounded the artery, the whole artery, and nothing but the artery. Needle should be passed between the artery and its vein. *Process of Repair, etc.*—The two inner coats are divided by the ligature and retract a little. A clot forms up to the nearest branch. Lymph is effused around the ligature. In the most favorable cases the lymph and the clot organize; and the cut arterial coats grow together, so that when the outermost coat is ulcerated through, a new barrier has been formed against hemorrhage. But these processes may wholly or partially fail. Then there is more or less danger of secondary hemorrhage. *Dangers.*—Secondary hemorrhage from above cause, or from suppuration. Gangrene, from non-establishment of collateral circulation, from injury to, and consequent coagulation in, the vein, or from suppuration of an aneurismal sac. Erysipelas and other accidents to which all wounds are liable. 2. *Ligature of an Artery open in a Wound.*—Be careful not to include neighboring nerve. Reef-knot. Hemp, silk, and catgut ligatures. Carbolyzed catgut is absorbed or organized, and scarcely, if at all, acts like a foreign body in the wound. One end of a hemp or silk ligature must be left hanging out of the wound.

AXILLARY.—Very rarely tied. Line of artery. From just internal to coracoid process, curving outward and downward to commencement of brachial artery. Divide skin and pectoralis major. Beware of vein and brachial plexus.

LIGATURE OF SPECIAL ARTERIES.—*Abdominal Aorta.*—1st method: incise the abdominal wall as in ovariectomy. Divide the peritoneum covering the aorta, and pass the ligature. 2d method: make an incision like that for ligature of common iliac, and proceed as if for ligature of that vessel, but keep a little higher. Doubtful whether operation is ever justifiable. For details, *vide* larger works.

Brachial.—In middle of upper arm. Line of incision, inner edge of biceps. Avoid basilic vein and internal cutaneous nerve; open deep fascia; look out for median nerve; artery usually lies just beneath it, but may be superficial to it. Remember occasional high division of brachial.

Carotid, Common.—Position: head back, face turned away at first. Place of selection: just above omo-hyoid (*i.e.*, level of cricoid cartilage). Line of artery, sterno-clavicular articulation to midway between mastoid process and angle of jaw; incise skin along anterior border of sterno-mastoid three inches; platysma; deep fascia. Raise head, relax and re-

tract sterno-mastoid ; look for omo-hyoid ; carotid sheath with descendens noni. As a rule, jugular vein and vagus nerve not seen. 2. In tying artery low down, divide partially sterno-mastoid, sterno-hyoid, and sterno-thyroids. *Fatality*.—40 per cent.: in ordinary cases one in three. When operation is for hemorrhage, 56 per cent. die. When for aneurism, on Brasdor's method, only one in four. For affections of the nervous system, only one in thirty-four. *Chief Dangers*.—Brain symptoms and secondary hemorrhage.

Carotid, External and Internal.—Ligature of common carotid preferred. For external carotid proceed as follows : line of incision same as for common carotid ; incision from angle of jaw to thyroid cartilage ; freely incise any glands which may be in the way ; tie and divide cutaneous veins ; look for hypoglossal nerve ; tie the artery between origins of supra-thyroid and lingual arteries.

Femoral.—The *common femoral* rarely tied ; ligature of external iliac preferred. Incise in line of artery ; crural branch of genito-crural nerve ; open sheath ; tie about one inch below Poupart's ligament ; pass needle from within outward.

Superficial femoral tied in two places : 1. At apex of Scarpa's triangle. Position : abduction and rotation outward ; knee flexed ; line of artery, from middle of Poupart's ligament to front of inner condyle ; incise skin 3-4 inches at junction of upper and middle thirds of thigh ; divide fat ; avoid saphena vein ; divide fascia lata well to inner side of sartorius, so as not to open sheath of that muscle ; retract sartorius outward ; feel for sheath of artery ; branch of ant. crural over sheath ; open sheath ; clean artery with point of director ; pass needle from inner side. 2. In Hunter's canal. Done when operation in Scarpa's triangle fails. If done at lower end of Hunter's canal, draw sartorius to inner side ; incision in the same line as when artery is tied in Scarpa's triangle, but longer, and of course lower down thigh. Other steps similar to first operation. *Fatality*.—One in four. Syme was successful twenty-three times in succession.

Iliac, Common.—Line of artery : from half-inch to left of umbilicus to middle of Poupart's ligament. Incision, from end of last rib downward and forward to crista ilii, and then forward above and parallel to crest of ilium as far as anterior superior spine ; divide muscles and transversalis fascia, using finger as a director ; roll up peritoneum and intestines out of way, and tie artery. Second method : incise skin first from outside internal abdominal ring, parallel to Poupart's ligament, three or four inches toward ant. sup. spine of ilium ; then continue incision with a curve inward toward umbilicus, and proceed with muscles and transversalis fascia much as in first method. Remember relation to veins, ureter, and spermatic vessels. *Fatality*.—Very great—twenty-five in thirty-two ! Chief causes : exhaustion and hemorrhage.

Iliac, External.—Line of artery same as common iliac. Incise skin half an inch above Poupart's ligament from just external to internal abdominal ring outward in a curve three inches long and parallel to the ligament; divide muscles and transversalis fascia carefully; push up peritoneum; separate artery from vein; pass needle from within outward; the higher up the artery is to be tied, the farther must the outer end of the incision be extended upward and inward, the incision thus becoming like that for the common iliac. Beware of seven dangers: 1, wound of epigastric artery; 2, wound of spermatic cord; 3, laceration of peritoneum; 4, puncture of external iliac vein; 5, of circumflexa ilii vein; 6, ligature of genito-crural; 7, too free disturbance of subperitoneal cellular tissue. *Fatality.*—One in three. Chief causes: gangrene, hemorrhage, and peritonitis.

Iliac, Internal.—Steps of operation as for common iliac. Trace internal iliac from bifurcation of common iliac; scratch artery clean with finger-nail and director; pass ligature three-quarters of an inch from origin. Beware of ureter, vein, and peritoneum. *Fatality.*—One in two.

Innominate.—Incision along anterior border and sternal end of sterno-mastoid; divide as much of sterno-mastoid as may be necessary to expose carotid, and trace carotid downward to innominate. *Fatality.*—Only one case has recovered. In it the carotid and vertebral were also ligatured (Smyth's case).

Lingual.—Line of artery: just above greater cornu of hyoid bone; incision horizontal, with centre opposite end of greater cornu of hyoid bone; look for hypoglossal nerve; artery crosses beneath it; divide hyo-glossus muscle from hyoid bone: artery is thus exposed. *Object.*—Usually to check hemorrhage from cancer of tongue.

Radial.—Line of artery: from inner side of biceps tendon at bend of elbow to half an inch internal to styloid process of radius. Ligature in *upper third*: incision in line of artery. Separate supinator longus from pronator teres, and tie. *Lower third*: divide skin and deep fascia to outer side of flexor carpi radialis.

Subclavian.—Tied only in third part of its course. Raise patient on a pillow, head back, face turned away, arm pulled down; incise along clavicle, pulling skin down over it; divide border of sterno-mastoid if necessary; deep fascia; retract external jugular; separate vessels and cellular tissue beneath deep fascia without using knife blade; feel for scalene tubercle and scalenus anticus. Subclavian lies behind them; brachial plexus and subclavian vein; pass needle from below upward. *Fatality.*—Nearly one in two. Chief causes: hemorrhage, gangrene, intrathoracic inflammation, "sloughing or suppuration of aneurism."

Tibial, Anterior.—Line of artery: from head of fibula to midway between two malleoli. *Upper or middle third*: divide skin in line of vessel; look for a white line in deep fascia, marking outer border of tibialis anticus; divide the line and separate tibialis anticus from ext. long. dig.

above, and from extensor prop. poll. below ; nerve superficial ; patient should put tibialis anticus into action before anæsthesia. *Lower third* : artery nearly superficial.

Tibial, Posterior.—*Upper half* : two methods—1 (Guthrie's), perpendicular incision, six inches long, through middle of gastrocnemius, soleus and deep (submuscular) fascia ; artery lies on tibialis posticus ; nerve crossing superficially and obliquely from within outward. 2d method : incision, three-quarters of an inch behind and parallel to posterior border of tibia, down to tibial origin of soleus. Separate soleus from bone, divide submuscular fascia, and find artery immediately beneath it.

Near Ankle.—Artery lies beneath thick deep fascia, rather nearer malleolus than heel. Incise over it.

Ulnar.—Line : from middle of bend of elbow, curving inward slightly, to outer side of pisiform bone. *Upper half* : incise obliquely over course of vessel and well to inner side of arm ; find outer border of flex. carpi ulnaris ; divide it from flex. sublimis, and find artery between superficial and deep flexors ; inner border of flexor sublimis may be found in thin people by putting that muscle in action.

Above Wrist.—Divide skin and deep fascia just outside tendon of flex. carpi ulnaris. Nerve on the inner side.

Asphyxia.—*Causes.*—1, Compression of chest ; 2, compression of lungs by air in pleura ; 3, traumatic compression of trachea, as in garrotting ; 4, foreign body in air-passages ; 5, immersion in some fluid, including (a) water (drowning), (b) some inert gas, (c) some poisonous gas ; 6, disease, including (a) pressure by aneurism, œdema glottidis, accumulation of mucus, etc., (b) paralysis of respiratory muscles. Hanging may be classed with Cause 3. *Appearances.*—Lividity, swelling of face, perhaps bleeding from nose or mouth. Post-mortem : engorgement of right side of heart, emptiness of left side of heart ; arteries contain venous blood ; abdominal viscera engorged ; lungs not peculiar when there has only been mechanical obstruction ; but in drowning they are filled with frothy water, doughy and heavy, and the air-tubes are choked with frothy and bloody water and mucus. Brain sometimes hyperæmic, especially after hanging or suffocation. *Prognosis.*—Almost hopeless after five minutes' submersion. Remember, a person may be immersed some time without being *submerged*. Recovery has taken place after three-quarters of an hour of asphyxia (Weeks). Prognosis much worse if water has got into the lung.

Treatment.—In drowning, hold the patient's head downward for a few seconds to begin with. In hanging or choking, bleed from jugular. If there is obstruction to passage of air through mouth or nose, open trachea. Then friction, warmth, warm bath (100°), ammonia to nostrils ; but begin at once artificial respiration, and continue it. Artificial respiration by 1, inflation from mouth to mouth ; 2, bellows ; 3, split sheet ; 4, Marshall Hall's method ; 5, Sylvester's ; 6, Howard's ; 7, inhalation of oxygen ; 8,

galvanizing phrenic nerve. With bellows, 15 cubic inches should be introduced 12 times a minute. Oxygen was successfully administered after three-quarters of an hour's asphyxia, in Weeks' case.

Sylvester's Method.—Lay body on back, on a plane inclined slightly toward feet; cushion under head; head in line with trunk; tongue drawn forward; grasp arms just above elbows and draw upward till they nearly meet above head; there retain them for two seconds; then depress them again and press them firmly for two seconds against the sides, combined, if possible, with pressure on lower part of sternum; repeat about fifteen times per minute. Remember, artificial respiration is to be attended to the first thing; warmth and friction are secondary; the endeavors should be kept up for at least three or four hours, even without any encouraging signs.

In *hanging*, besides asphyxia, there is usually some apoplexy as well as injury to the spinal cord.

Aspiration.—The aspirator is an exhausting syringe, used for drawing off fluids without admitting ingress of air, and in exploring for purposes of diagnosis. The needle should be pressed in with a screwing motion, and the taps should be managed carefully and without hurry.

Atheroma.—*Vide* ARTERIES, ATHEROMA OF.

Atheromatous Tumors.—*Vide* TUMORS (CYSTS).

Back, Sprains of.—Usually occur in neck or loins, often affect intervertebral ligaments; tumefaction, rarely ecchymosis, stiffness, tenderness; in severe cases, patient lies on his side, semi-flexed; hæmaturia when the kidneys are hurt; occasionally symptoms of paralysis; if such persist, intravertebral hemorrhage, inflammation of the meninges, or injury to the cord, are indicated. *Causes.*—Falls on head or buttocks, railway collisions, Rugby football, etc. *Diagnosis.*—From fracture or dislocation, line of spinous processes straight; tenderness more or less diffuse; patient can probably, though with pain, raise himself into the erect position, straightening his spine. *Prognosis.*—Good, even when there is hæmaturia; even severe paralysis sometimes passes off in a day or two, but danger of inflammation spreading to meninges of cord. This danger is greatest in atlanto-axial region. *See* SPINAL MENINGITIS, FRACTURE, HEMORRHAGE, etc. *Treatment.*—Rest. *See* SPRAINS. Actual cautery and Corrigan's button or Sayre's jacket in obstinate cases.

Balanitis.—Inflammation of glans penis or lining membrane of prepuce. *Causes.*—Gonorrhœa, phimosis, dirty habits, ill-health. *Treatment.*—Warm water, zinc ointment, astringent lotions, nitrate of silver. A chancre may coexist.

Bar at Neck of Bladder.—*Definition.*—“Any bar” at the inferior aspect of the neck of the bladder, and not prostatic in its nature. Extremely rare. *Treatment.*—Relieve accompanying chronic cystitis; occasionally pass a large catheter. *Vide* Thompson and Guthrie.

Barbadoes Leg.—*See* ELEPHANTIASIS ARABUM.

Bath, Continuous Water-Bath, or Immersion Treatment of wounds and compound fractures. Temperature varies; cold water delays the healing, but prevents blood-poisoning; in compound fractures the limb is placed in a fenestrated plaster case, made water-tight with shellac, cement, or collodion. Used at Berlin.¹

Bed-Sores attack the skin over hard prominences, *e.g.*, sacrum, ischial tuberosities, trochanters, condyles of knees, elbows, and the heels. First the skin reddens, then an abrasion may form, then a slough; in bad cases even spinal canal may be opened. *Causes.*—Predisposing are debility, continued fevers, especially typhoid, paralysis, old age; exciting causes are continued pressure, irritation of fæces and urine, the under sheet and night-shirt not being kept smooth by the nurse, *etc.* *Prognosis.*—Depends chiefly upon whether the cause can be removed or not. *Treatment.*—Preventive measures are good nursing, dry, smooth draw-sheets, water-beds or cushions, frequent change of position. The buttocks, *etc.*, should be rubbed twice a day for five minutes with camphorated spirit, or with a mixture of olive-oil and brandy (equal parts); or bathe the part with hydrarg. perchlor. in sp. vin. rect. (gr. ij.— $\bar{5}$ j.); prominences should be covered with amadou plaster; when an abrasion forms, apply collodion and try to take off the pressure; when a slough is forming, use a thick poultice; when slough separates, use stimulants, *e.g.*, resin ointment, balsam of Peru on cotton-wool. Prone position sometimes necessary.

Bees, Stings of.—*Treatment.*—Rubbing with olive-oil, strong liquor ammoniæ, indigo, eau de Cologne, vinegar, flour, *etc.*; remove the sting if it can be found; ice.

Biceps Humeri, Contraction of.—*Treatment.*—If the arm can be extended under anæsthetics, keep it so for some time on a splint; otherwise, tenotomy may be required; but manipulation, patiently practised, will often succeed.

Biceps Humeri, Division of Tendon of.—Insert knife on inner side, pass it beneath the tendon, and cut outward and toward the skin; press brachial artery away during operation.

Biceps Femoris.—In dividing this, pass tenotome in parallel to, and keep it close to the tendon.

Bites of Poisonous Snakes.—*Symptoms.*—Local, are rapid swelling, redness, lividity, phlyctenule filled with sanious fluid; swelling spreads, whole body assumes a jaundiced hue; resemblance to ordinary phlegmonous erysipelas; but “the first symptom, in nearly all cases, appears to be a general shock to the nervous system”—faintness, tremor, great depression, sometimes stupor, loss of sight, vomiting, trismus, and general in-

¹ It has been found that it causes the lips of the wound to swell greatly, and sometimes, therefore, to prevent escape of discharge.—*London Medical Record.*

sensibility ; great local pain. *Pathology*.—First effect is a shock to the nervous system ; second is a diffuse cellulitis, spreading from the wound. It appears that virulent snake-poison may be applied to slight abrasions, to denuded muscle, cartilage, periosteum, to mucous membrane, and even to the medullary cavity of bones, with no more effect than local irritation, though the same poison inoculated into the subcutaneous cellular tissue would be rapidly fatal. *Prognosis*.—Depends on relative size of snake and victim, on situation of wound (worst when on face or trunk), and, of course, on kind of snake.—See G. Busk, in “Holmes’s System.” *Treatment*.—Ligature above part bitten ; sucking wound ; caustics, actual cautery ; excision ; injection of wound with ammonia or carbolic acid ; injection of ammonia into the veins (Halford) ; Liq. ammon. fort., ℥x., ad aquæ fort., ℥xx., to be injected into a large vein near the wound ; rubbing with olive-oil. The strength must be kept up with milk, eggs, wine, soups, etc. ; the spirits must be cheered.

Bites of Rabid Animals.—See HYDROPHOBIA.

Bladder, Atony of, arises from muscular weakness of old age, or after fevers, or paralysis, or from continued obstruction by enlarged prostate or organic stricture. It must not be confounded with actual paralysis. *Symptoms*.—Retention, or else incontinence of urine, caused by the overflow of the bladder. *Treatment*.—Catheterism twice a day ; cold douche and frictions to lumbar spine, and injections of cold water. Electricity. Sometimes strychnine when a spinal affection seems to be the cause. *Prognosis*.—Depends upon curability of the cause and upon duration of the disease.

BLADDER, CANCER OF.—Epithelioma is very rare, and slow in its progress. Scirrhus is most rare, except as an extension from neighboring organs. Encephaloid is more common. *Symptoms*.—Frequent and difficult micturition ; pain in neck of bladder, often extending to loins and hips as well as perinæum ; hemorrhage usually sudden and copious ; frequent and continuous oozings are more characteristic of villous growth (Thompson) ; enlargement of pelvic and lumbar glands ; sometimes cancer-cells are found in urine ; growth may be felt per rectum or by catheter ; cachexy. *Prognosis*.—Encephaloid cases last, on an average, twelve months ; Brodie has known a duration of seven or eight years. *Treatment*.—Attend to general health, state of bowels, appetite, etc. Use anodynes, especially subcutaneous morphia injections, with no niggard hand ; morphia suppositories ; alcoholic stimulants. For the hemorrhage, cold, rest, and injections, silver nitrate, gr. ss. to $\frac{3}{4}$ j., iron, and other local astringents. Recumbent posture in some cases. Some tumors in the female bladder are accessible for operation.

BLADDER, CATARRH OF.—Chronic inflammation with mucopurulent secretion. *Causes*.—Generally either stricture, calculus, or enlarged prostate ; often paralysis ; atony, ulceration, tumors, cancer ; a sequel of acute cys-

titis; may arise from disease of neighboring parts, anus, rectum, vagina, and uterus; gout, gonorrhoea, foreign bodies, and, in fact, any irritant which can affect the bladder. *Symptoms*.—Frequent micturition; urine ammoniacal, fetid, mixed with stringy mucus, deposits phosphates; the general health gradually gives way; pain, generally dull and radiating along perineum, anus, urethra, etc. *Pathology*.—The mucous membrane is thickened and congested, and the subjacent muscular tissue hypertrophied. *Prognosis*.—Recovery may take place in recent cases, but old cases generally die eventually, worn out, or else in a typhoid state. *Treatment*.—1. Local: wash out bladder with warm water, or solutions of acetate of lead ($\frac{1}{6}$ gr. to 1 oz.), argent. nitrat. ($\frac{1}{8}$ gr. to 1 oz.), nitric acid ($\text{℥}\frac{1}{2}$ to $\text{℥}\text{j.}$); the strength may be gradually increased. P. P. White, of Dublin, uses 4 gr. borax to 8 oz. of “very hot water.” When the urine is fetid, carbolic acid ($\text{℥}\text{j.}$ to $\text{℥}\text{iv.}$). Manipulate very gently, and inject only 2 or 3 oz. at a time. Counter-irritation; croton-oil or iodine to pubes, linseed and mustard poultices to pubes. 2. Internal remedies: anodynes by mouth and rectum. Aperients. Buchu, uva ursi, pareira brava, triticum repens, iron. Dr. Gross strongly recommends copaiba and cubebs when the secretion is excessive. Demulcents: decoctions of marsh-mallow, linseed, Irish moss, elm-bark, or barley. The urine should be made neutral, if acid. Diet is very important: light, nutritious, farinaceous; milk and fish. Rest horizontally; warm clothing; warm climates. In severe cases the lithotomy incision has been made by Gross, Wheelhouse, Teevan, and others.

BLADDER, DILATATION OF, without hypertrophy, sometimes exists.

BLADDER, EXTROVERSION OF.—A congenital malformation, in which the anterior wall of the bladder and the adjacent part of the abdominal wall are absent. More common in males than in females. *Symptoms*.—The red mucous membrane of the posterior wall of the bladder presents in the pubic region as a flattened tumor, on which the orifices of the ureters may be found; umbilicus absent; epispadias; urine always dribbling; consequent excoriations and urinous odor; impotence in the male. *Treatment*.—Zinc ointment for excoriations; urinals carefully fitted to the case. Radical cure by operations of Ayres, Wood, or Holmes. Skin-flaps are turned down from the neighboring parts—groins, scrotum, etc.—and united so that one surface of skin turns toward bladder, the other outward. T. Smith's operation—ureters into rectum.

BLADDER, FOREIGN BODIES IN.—*Treatment*.—Urethral forceps, lithotrite, operation as for median lithotomy.

BLADDER, HYPERTROPHY OF, arises from obstruction to the passage of urine, and from continued irritation. Commonly coexists with catarrh. Its existence can be inferred from that of its causes. *Treat* the catarrh and remove the causes.

BLADDER, ACUTE INFLAMMATION OF, usually affects trigone. *Causes*.—Predisposing are male sex, adult age, cold weather and season, intemperate

habits, urinary obstruction. Common exciting causes are wounds, *e.g.*, lithotomy; calculi, intemperance, stricture, gonorrhœa, injury during parturition, protracted retention. Other causes are blows on perinæum or hypogastrium, stimulant diuretics, *e.g.*, cantharides; blisters, catheterism, lithotripsy. *Symptoms*.—Pain locally, affecting perinæum, pubes, groins, sacrum, thighs; extreme irritability of bladder; urine voided spasmodically as soon as it enters bladder. In severe cases, such as those which may follow lithotomy, there are rigors, often delirium, extreme local tenderness, and great danger. In milder cases, such as often result from gonorrhœa, the symptoms are chiefly local. Urine deposits mucus and pus; in severe cases it is bloody. *Pathology*.—Usually commences at, and is often confined to neck of bladder; mainly affects mucous membrane; this is thickened and congested; in protracted cases it gets dark in color. Occasionally lymph is exuded so as to form false membrane. *Prognosis*.—The mild form yields to treatment. The virulent form, especially in shattered constitutions, is often fatal, death being sometimes preceded by gangrene. *Treatment*.—Cathartics: castor-oil, black draught, or calomel; diaphoretics; demulcent drinks, flavored with a little lemon-juice; all drinks to be tepid; opiate suppositories and enemata; colchicum in gouty cases. Hot baths; linseed and mustard poultices to the abdomen and perinæum; fomentations; leeches (five, ten, or more) to the perinæum and margin of anus. Cupping the loins when there is pain in that region. Retention should be watched for and may require catheterism. Painting hypogastrium and perinæum with T. iodi.

BLADDER, INVERSION OF.—Four cases have been recorded. Occurs in female children only.

BLADDER, IRRITABILITY OF THE, always a symptom only, though its importance has given it the rank of a disease. *Causes*.—1, Disease of the urinary apparatus: vesical catarrh, stricture, prostatic disease, foreign body, tumor or calculus in bladder, disease of kidney or ureter, gonorrhœa; 2, state of urine, most common in elderly males; 3, diuretics, cantharides; 4, venereal excesses, onanism, a long and narrow prepuce; 5, indigestion, ascarides, hemorrhoids, fistulæ, prolapsus ani, pruritus ani; 6, nervous disorders, hysteria, depressing emotions, excessive mental exertion; 7, debility from many causes; 8, exposure to cold; 9, ovarian and uterine diseases. *Symptoms*.—Frequent micturition, but the total amount of urine passed not excessive. *Prognosis*.—Good, when the cause can be removed. The disease is intractable in weak, scrofulous subjects. *Treatment*.—Remove the cause, if possible; any way, treat the cause. Ext. belladonnæ, gr. one-sixth per diem; copaiba; tinct. cantharidis; buchu; pareira brava. Farinaceous diet.

BLADDER, NEURALGIA OF.—Very rare. Sometimes reflex, and depending on conditions of the liver, kidney, nerve centres, etc.

BLADDER, PARALYSIS OF.—A name applied to loss of power of the bladder,

from nervous affections. Weakness from injury or disease of its muscular walls is called atony (which see). *Causes*.—Injuries or diseases of the spinal cord and brain; reflex paralysis from operations, especially those for hemorrhoids; shock; debilitating diseases, especially continued fevers; sexual excesses, especially in old men; mechanical injury, *e.g.*, in protracted parturition; over-distention; severe inflammation; hysteria. *Symptoms*.—Firstly, retention, and then incontinence also. Paraplegia often present. The distended bladder forms an abdominal tumor. *Prognosis*.—Depends chiefly on cause. Sometimes fatal, even when promptly relieved. *Treatment*.—Pass a full-sized catheter; only partially empty bladder at first, if the distention be great; regular catheterism twice a day; cathartics; tonics; strychnine; cantharides; iron; quinine; arsenic. Electricity. Counter-irritation: cold douche. If possible, avoid catheterism in hysterical cases; try ordinary remedies for hysteria.

BLADDER, PUNCTURE OF.—1, Supra-pubic: incise skin for half an inch in middle line, just above pubes; then plunge in curved trochar downward and backward; leave a soft catheter in the wound. 2. Per rectum: guide a curved trochar on the left index finger in the rectum, till the point can be placed against the bladder, in the middle line just behind the prostate. During this first step, keep the trochar quite sheathed; then project the point, and plunge the instrument into the bladder; leave in a soft catheter.

BLADDER, RUPTURE OF.—The bladder is generally full at the time, and the patient often intoxicated. The usual causes are the passage of a heavy wagon over the abdomen, a fall or blow on the hypogastrium, a wound, or extreme retention of urine. *Symptoms*.—Sudden and violent pain in the pelvis or hypogastrium; great desire to urinate, but no urine passes; the catheter readily enters the bladder, but draws off only a small quantity of urine, which may be bloody. Collapse, then peritonitis. *Prognosis*.—Almost always fatal, except where there is an open wound, with the peritoneum uninjured. *Treatment*.—Use a catheter open at the extreme tip, to keep the viscus empty; do not pass it far into the bladder; use the proper remedies for peritonitis, especially opium and warm applications, but avoid depletory measures. If you feel sure of your diagnosis, it is justifiable to open the abdomen antiseptically, wash it out, and sew up a rent in the bladder.

BLADDER, STAMMERING OF, or, rather, of urinary organs.—A condition in which, without any more visible organic disease than exists in stammering of the vocal organs, the sufferer cannot micturate freely at will. The stammering is usually aggravated by anything which directs the patient's attention to the act of micturition, or which makes him "nervous," or by temporary disorder of digestive or urinary organs. *Treatment*.—Strengthen general health, attend to digestion and state of urine. Teach patient to pass a catheter for himself, so that he may be free from fear of retention. (Paget's *Clin. Lect.*)

BLADDER, TUBERCLE OF, seldom, if ever, occurs except with tubercle of other urinary organs. *Symptoms*.—Those of ulceration in a tuberculous patient. *Treatment*.—That of tuberculosis: anodynes; rest.

BLADDER, TUMORS OF, are: 1, fibrous; 2, villous; or 3, cancerous and not villous. The first may cause no symptoms, or, if unfortunately situated, those of obstruction or irritation. The second causes constant hemorrhage, which is generally at last fatally exhausting. For the third, see CANCER OF THE BLADDER. The catheter must be gently used where there is obstruction; mild astringents and rest for hemorrhage; strength to be supported by chalybeates, good diet, etc. In women, vesical tumors may sometimes be felt and removed through the urethra. The villous growth is sometimes the cause of severe pain, and may or may not be cancerous.¹

BLADDER, WASHING OUT, may be done either with a double-current catheter or with Clover's apparatus, with Bigelow's apparatus, or with a syphon-tube.

Bleeding.—Venesection. Veins used: median-cephalic, median-basilic, external jugular, saphena veins near ankle, veins of scrotum. Instruments required: bleeding-tape or bandage, bowl, lancet, pad, sponge, and water. Apply tape to middle of upper arm, tight enough to congest veins, but not to affect pulse. Hang arm down a little while; then choose spot and apply thumb just below it. Pass lancet gently and obliquely into vein, and enlarge opening without deepening incision; draw off enough blood. If necessary, make patient work his hand, opening and shutting it. Finally, apply pad over wound; fix it with the tape; put arm in sling for two days. In opening external jugular, put the pad just above the clavicle, and cut in the direction of the fibres of the sterno-mastoid. Bathe the veins of the scrotum with warm water before and after opening them. Arteriotomy.—Cut the temporal artery, or its anterior branch, half in two transversely; when enough blood has flowed, divide it completely, and apply a pad and bandage.

Blennorrhœa=Gleet, *vide* GONORRHŒA.

Boils.—*Causes*.—Debility or plethora (but these causes are probably never sufficient when uncomplicated); change of diet; excessive perspiration; hydropathy; sea-bathing; air of dissecting-rooms; training; spring and early summer season; diabetes; diseased meat; irritation of sexual organs; local irritants of various kinds, *e.g.*, edge of a frayed shirt-collar; poultices. *Symptoms*.—The local appearances are well known. There is rarely any fever. Sometimes premonitory symptoms, such as feeling of chilliness, bad temper, etc. *Pathology*.—In the first instance, a boil is frequently indistinguishable from an acne-spot. Indeed, in a person suffering from an attack of boils, almost any acne-pimple can be irritated into a boil by

¹ Papilloma of bladder is always attached to trigone between the two ureters (Rindfleisch).

persistent friction, or by exposure to some continuous irritant, such as the sea-water constantly wetting the wrists of fishermen. A boil is a local cellulitis, often spreading from an inflamed sebaceous follicle; and the reason of this spreading is, in most cases, not the specific nature of the original cause, but persistent local irritation. As it is quite as easy to protect from local irritation, and to check the acne, as to cure the specific cause of boils, if there be one, I hold that this view of boils is of practical importance. The "core" of a boil is a central slough of cellular tissue.

Treatment.—Local. Soap-plaster. Poultices or water-dressing should be avoided, as they bring out fresh boils. Incision (complete) of very painful ones. Ext. belladonna and glycerine on lint. Blind boils may be aborted by the application of a strong caustic to the commencing vesicle; strong carbolic acid locally (Eade of Norwich). *General Treatment.*—Regulate the diet. When any poison appears to have been absorbed, use eliminative treatment, *e.g.*, purgatives, Turkish bath; moderate exercise; light clothing; arsenic; yeast, one tablespoonful three times a day. See Smith's article in Holmes' "System," vol. v. Bathe part where the boils chiefly appear, with water as hot as it can be endured, and, above all, remove every cause of local friction or chafing.

Bones, Diseases of, resemble those of the soft tissues, but are remarkable for the extreme slowness with which the pathological changes usually take place.

NOTE.—The pathology of the varieties of inflammation in bone and periosteum will be given collectively, for the sake of convenience and clearness.

BONE, ATROPHY OF.—*Causes.*—Injury, *e.g.*, fracture; chronic inflammation; disuse, *e.g.*, in the case of the bone of a stump; old age, *e.g.*, atrophy of the lower jaw; pressure, *e.g.*, that of a tumor. *Pathology.*—The bone becomes not only smaller, but its cancellous and medullary spaces enlarge; a certain amount of fatty degeneration is frequent.

PATHOLOGY OF OSTEAL AND PERIOSTEAL INFLAMMATIONS.—*Pathology of Acute Periostitis.*—Attacks chiefly the long bones, especially the femur; medulla may be coincidently inflamed. In a typical case, in which both periosteum and medulla are affected, the vessels of each are highly injected, and the intervascular tissue infiltrated with young corpuscles; this stage may end in complete resolution, in ossification of some of the inflammatory new-formation; or, as in most cases unfortunately, it may end in suppuration; then the skin reddens, the œdema becomes marked, and neighboring joints swell; the suppuration separates the periosteum, not usually from the whole shaft, but frequently from half of it, though often only on part of the circumference; except in rare instances in small children, necrosis is now inevitable. See NECROSIS OF BONE.

Pathology of Chronic Periostitis.—It is often accompanied by superficial inflammation of the bone itself. The two layers of the periosteum (in-

ternal, fibrous, and external, cellulo-vascular) cannot be separated from each other, but are swollen, infiltrated with young cells, and traversed by dilated capillaries; they are easily separated from the adjacent bone, whose surface is generally covered with small nodules of new bone; the general opinion is that these nodules (osteophytes) grow from the periosteum; periostitis, with the formation of these osteophytes and without suppuration, is usually syphilitic. When suppuration occurs, it may be without any destruction of bone, caries, or necrosis; but usually the bone is rough and gnawed, often to a considerable extent; this occurs especially in strumous periostitis. Then again, in other cases of chronic periostitis, a soft, fluctuating swelling forms, consisting not of pus, but of granulations springing from carious bone; these cases are often also strumous.

Pathology of Caries.—Chronic inflammation causes the corpuscular and vascular elements of the soft parts of bones to increase at the expense of the earthy parts; the young cells seem, as it were, to corrode the walls of the lacunæ, etc., in which they lie; these corrosions, spreading and uniting, may cause destruction to an indefinite extent; the bone thus corroded is dissolved, and is either absorbed or flows away in the discharges. Around the region of caries is sometimes a zone of sclerosis, *i.e.*, of bone in which the inflammatory new material has ossified between the trabeculæ of the original bone. The distinctive characters of *strumous caries* are thus given by Walsham ("Surgical Pathology," p. 16): "It is characterized by the tendency of the inflammatory products to undergo caseous degeneration, by the extensive destruction of the affected part, by the softened, fatty, and oily condition of the bone around, by little tendency to the formation of new bone, and by feeble efforts toward repair."

Pathology of Necrosis.—Dead bone is bloodless, and either white, or else darkened by the action of air, pus, or blood; on the surface lately continuous with living bone it is rough and corroded; but on the free surface, usually smooth. The process of separation of necrosed bone is as follows: granulations form at the plane of contact of living and dead bone, and these granulations dissolve the earthy medium still uniting the dead to the living bone, thus setting the former free; the soft tissues in contact with dead bone loosen from it everywhere, and often a layer of pus intervenes; then the dead bone lies in an abscess-cavity. When part or whole of the shaft of a long bone necroses, these same neighboring soft parts, most especially the periosteum, proceed, as a rule, to build a shell of new bone, within which the necrosed bone lies; this shell is perforated in one or more places by cloacæ (passages for the egress of discharge); the piece of necrosed bone is called the *sequestrum*; it takes months to separate from the living bone; it is eventually either discharged or absorbed, or removed by operation, or it may remain even for years. So long as it remains, the new bone around it usually grows thicker; when it is removed, the remaining cavity fills with granulations, which ossify;

gradually the new bone, by a process of external absorption and internal growth, gets to resemble more and more the shape and consistence of the original bone whose place it is to take. Practically speaking, only the smallest sequestra can be absorbed. In necrosis of flat, and of short, spongy bones, there is small prospect of thorough reproduction; in these cases necrosis is usually combined with caries, and often with a chronic constitutional disorder. Necrosis, when confined to the surface of a bone, is called "superficial," and when to the interior of a bone, "central;" in the former the sequestrum is called an "exfoliation;" central necrosis constitutes almost an independent disease.

Pathology of Central Necrosis is the result of inflammation of the deeper parts of a bone, and is usually accompanied by caries; it leads to a bone-abscess, to a simultaneous periostitis on the neighboring external surface of the bone, and to a consequent apparent thickening of the bone. Note: though central necrosis is pretty sure to lead to abscess, yet abscess of bone does not usually imply necrosis.

CHRONIC ABSCESS OF BONE.—First described by Brodie. Most usual seat, head of tibia. *Causes.*—Obscure, sometimes injury. *Symptoms.*—Those of ostitis and periostitis confined to a circumscribed locality. An abscess is suspected because of the persistence of the symptoms, and because of the localized and circumscribed tenderness. *Diagnosis and treatment* require the same proceeding, viz., trephining at the tenderest spot. Generally the abscess is here very superficial. The trephine has in some cases just missed the cavity. Holmes advises in such cases to perforate the walls of the trephine-hole in several directions in search of the pus. *Prognosis* is excellent when the trephine pierces the abscess; otherwise there is danger of abscess opening into a neighboring joint.

INFLAMMATION OF BONE.—Three chief varieties, according to part mainly attacked, viz., ostitis, periostitis, and osteo-myelitis.

1. *Ostitis.*—Inflammation may begin in the bone proper, without affecting the periosteum or medulla at first. *Causes.*—Though it is often excited by an injury, there is usually some predisposing cause—syphilis, struma, or simple constitutional debility. *Symptoms.*—Deep-seated, aching pain, worse at night, and other symptoms, all like those of periostitis. *Results.*—It usually ends in either caries or sclerosis, *quod vide*. *Treatment.*—Counter-irritants, e.g., iodine, or warmth and moisture locally, or cold applications. Treat cause; iodide of potassium. Linear osteotomy in bad cases—Erichsen. Linear osteotomy is the longitudinal division of the part of the bone affected, down to the medullary canal, by a Hey's saw. Mild counter-irritants, rest, and elevated position, perhaps gentle compression and weak purgatives, are the best abortive treatment when the disease is commencing.

2. *Periostitis, Chronic or Subacute*—*Causes.*—Syphilis, rheumatism, injuries; may be secondary to ostitis, or spread from an inflamed articu-

lation. *Symptoms*.—Swelling, aching pain, worse at night; heat; skin usually not reddened; swelling mostly in the form of a node. *Prognosis*.—Usually ends in resolution; often causes thickening of the bone, growth of osteophytes; rarely ends in suppuration. *Treatment*.—See OSTITIS. Also an incision, subcutaneous or otherwise, to relieve a bad case.

Periostitis, Diffuse.—*Causes*.—Age, usually about puberty; sex, mostly in boys; generally follows injury; strumous. The effusion strips the periosteum from the bone, and almost always causes necrosis, sometimes of an entire shaft of a long bone. *Symptoms*.—Femur or tibia usually affected; swelling, heat and pain, easily confounded with cellulitis or acute rheumatism, but it does not spread over the joints above and below the bone; both local and constitutional symptoms very severe; suppuration; then rigors, glistening skin, fluctuation, etc. For further course, etc., see NECROSIS. *Prognosis*.—Highly dangerous; death may occur before suppuration, or may result from exhaustion or pyæmia afterward. *Diagnosis*.—From acute rheumatism or cellulitis; care only required; no rheumatic affection of heart, or any separate joint; fever different, etc. *Treatment*.—Rest, elevated position; local applications, warm fomentations; free incision when abscess has fairly formed; incisions to remove tension at an earlier period usual. Such early incisions predispose to pyæmia (Billroth). Such incisions can be made antiseptically. *Vide* also NECROSIS.

3. *Osteo-myelitis*, or inflammation of the medulla of a bone, is extremely rare, except as the result of direct injury, *e.g.*, from compound fracture or after amputation through a bone. Inflammation of a bone may be judged to begin in the medulla if the swelling does not appear till some days after the severe local pain; there is always violent fever; the periosteum separates from the diseased bone without being pushed off by suppuration; the prognosis and treatment resemble those of diffuse periostitis, only the former disease is even more serious; authorities are divided as to whether a limb, known to be affected with acute osteo-myelitis, should be amputated or not; a limited osteo-myelitis, after amputation and leading to a slight necrosis, is frequent, and not necessarily serious.

NECROSIS.—*Causes*.—The same as those of periostitis, ostitis, and osteo-myelitis. Necrosis of the jaw occurs, less frequently now than formerly, among workers in phosphorus; and it is said that the phosphorus fumes attack only those with unsound teeth. For immediate causes, see the section on Pathology of Bone Diseases (*supra*). *Symptoms and Diagnosis*.—Necrosis may be fairly presumed to have occurred when (1) inflammation of a long bone or its periosteum has been acute or prolonged, while (2) extensive hard thickening has taken place, indicating the formation of new bone, and (3) the pus from any sinus existing is thick and yellow. In caries, on the other hand, the spongy bones are the usual seat, the formation of new bone is usually slight, the pus thin and serous; but the probe is required to settle the diagnosis. If gently used it causes little or no pain

in necrosis, usually much pain in caries ; the sequestrum in necrosis feels smooth and hard ; carious bone is rotten ; but it is to be remembered that the probe may fail to reach the sequestrum, and that in a few cases enormous thickening exists with caries only. The probe should be pressed firmly against the sequestrum, to feel if it is movable and ready for "sequestrotomy." Necrosis is sometimes found to have occurred without any history of precedent inflammation. This is called "Quiet Necrosis." *Vide* Paget's "Clinical Lectures," and Marrant Baker, in "St. Bartholomew's Hospital Reports," vol. xiii. *Prognosis* depends on the acuteness of the inflammation, and on the extent of bone involved. Acute necrosis of the whole shaft of a long bone is excessively dangerous. Pyæmia sometimes follows the opening of the abscess. *Treatment*.—Treat the cause, *e.g.*, struma ; before suppuration, try to cause resolution by counter-irritants, cold, etc.; when abscess has fairly formed, open it ; some recommend incisions before then, merely to relieve the tension of the periosteum. Billroth condemns this plan, saying that it predisposes to pyæmia. When necrosis has actually taken place, you must wait till the sequestrum has loosened and then remove it, treating the general health in the meantime. Unless the sequestrum can be felt loose, a very considerable time, even many months, had better be allowed before attempting to remove it by operation. *Operation for Necrosis*.—Tourniquet, or (much better) Esmarch's bandage ; sponges, etc., scalpel, Hey's saw, cutting-pliers, necrosis-forceps, gouges, chisels, hammer, probe, oiled lint, bandages, and minor instruments. Incise the soft parts ; it is often advisable to unite two sinuses by the incision. Cut a sufficient, but no larger, opening in the sheath of new bone ; divide the sequestrum if it cannot easily be removed whole ; plug the cavity with oiled lint. When the whole shaft of a long bone has necrosed, it had better be removed as soon as the acute symptoms have passed away, unless the epiphyseal cartilages have been involved in the inflammation. It may be desirable to divide it in the middle by a chain-saw. A new shaft may be expected to form, unless the epiphyseal cartilages have been destroyed ; in this case a new shaft can only be expected when the sequestrum is left for a long time *in situ*. If the necrosis be extensive, and for some reasons cannot be removed, while the patient's health is giving way, amputation must be done.

HYPERTROPHY OF BONE is commonly the result of inflammation, which may or may not be specific. The cause should be treated. The disease may follow a blow.

BONE, INJURIES OF.—Blows are liable to cause atrophy in the old, and strumous disease in the young and weakly ; they are sometimes followed by hypertrophy. *See* FRACTURES, etc.

MOLLITIES OSSIUM.—A disease allied to fatty degeneration of bone. *Causes*.—Mostly attacks females ; age, middle life or later ; pregnancy. *Symptoms*.—At first, rheumatic pains, then various bones soften and bend, and afterward fracture. The general health is only injured by the

physical effects of the resulting fractures and deformities. The chest and spine being deformed, the thoracic and abdominal viscera may be compressed, and a distorted pelvis impedes delivery. Large quantities of phosphates in the urine. *Diagnosis*.—From rheumatism, syphilis, and cancer; a bone fractured through the weakening effect of cancerous deposit gives way suddenly without bending previously. *Prognosis*.—Almost always fatal sooner or later, through weakening the power of the constitution to resist intercurrent disorders; rarely fatal through its own cachexia; cases of recovery are excessively rare. *Treatment*.—Tonics, cod-liver oil, phosphates, attention to digestive functions; special gymnastics for the deformities.

OSTEITIS DEFORMANS.—A very rare disease, lately described by Sir James Paget in the "Medico-Chirurgical Society's Transactions." *Chief Characteristics*.—General enlargement of the bones, with sufficient softening to permit slight loss of height (several inches) through arching of the long bones of the lower extremities and bending forward of the head on the breast; ribs also thick and immovable; skull thickened; cranial sutures obliterated; compact substance greatly increased. According to Butlin, the microscopic changes indicate that the disease is an inflammation rather than a new-growth. In this view Paget concurs, hence the name "osteitis." But the frequent coincidence of sarcoma and carcinoma with this affection is most remarkable. Little or no pain usually, only clumsiness. Disease lasts for years, and death has often occurred from the intercurrent of the above-mentioned malignant tumors. The usual remedies for other forms of osteitis appear to be of no avail. The large doses of pot. iod. and of arsenic, which have given Esmarch and Billroth encouraging results in the treatment of new-growths, have not, to my knowledge, been tried in this very rare disease.

OSTEO-ANEURISM, or PULSATING TUMOR OF BONE.—Almost always malignant; usually occurs in cancellous ends of long bones, in skull, and pelvis. *Symptoms*.—A tumor, "oval, uniform, and elastic to the touch, growing slowly;" pulsation and a bruit (the latter sometimes, but rarely, absent). Tumor may be partially emptied by pressure, and then the bony margin of the cavity in which it lies may be felt. Crackling shell of bone sometimes felt over it. *Diagnosis*.—1. The diagnosis of innocent from malignant pulsating tumor: in the latter case there may be evidence of malignant disease elsewhere; the tumors may be multiple; the growth is probably more rapid and the tumor painful. 2. From ordinary aneurism: by considering the situation and the characters mentioned above. *Prognosis*.—Depends upon whether tumor is malignant or not. *Treatment*.—For innocent cases try pressure on, or ligature of, the main artery; Esmarch's bandage might be tried; innocent tumors have also been gouged out. All other cases require amputation.

SANGUINEOUS TUMORS OF BONE.—*Vide* CYSTIC TUMORS.

SCROFULOUS DISEASE OF BONE.—*Causes.*—*Vide* SCROFULA. Often follows injury. *Symptoms.*—Swelling, usually of an indolent and chronic character; superjacent skin commonly pale, hence the term “white swelling.” Other symptoms of scrofula: in a large proportion of cases some internal organ is the seat of tuberculous or cheesy deposit. As the disease advances, there are symptoms of caries and abscess, the latter often appearing far away from the diseased bone. Most of the sufferers are children. The mischief often spreads to neighboring joints, and the suppuration tends to spread far and wide along intermuscular spaces, etc., before the abscess bursts. *Diagnosis* rests on the local symptoms above given, and on the presence or absence of other signs of the scrofulous diathesis. *Prognosis.*—Local recovery may usually be expected (in about two years, according to Stanley) if the general health holds out, but relapse is very common both in the original seat of the disease and elsewhere. *Treatment.*—General treatment of scrofula. Locally: complete rest; counter-irritation by painting with iodine, etc., till abscess fairly forms, and even afterward (Furneaux Jordan). There are special apparatus to give rest to special parts of the body: *e.g.*, for *morbus coxæ* and for Pott’s curvature, *quod vide*. Remove the diseased bone by operation in suitable cases.

SYPHILITIC DISEASE OF BONE.—Usually, if not always, begins in the adjacent soft parts. *Symptoms.*—The first are usually pains like those of rheumatism, and worse at night. They are called “osteoscopic.” Then nodes are found. They are circumscribed, round or oval swellings, occurring chiefly on such bones as are subcutaneous, but sometimes elsewhere, *e.g.*, upon the inner surface of the skull. The primary affection is in the periosteum. Small tendency to suppuration. Production of new bone. Caries and necrosis caused by more acute syphilitic periostitis. Three forms of syphilitic ulceration of bone, viz., the annular, the tuberculated, and the reticulated. Dry caries (*caries sicca*) is frequently syphilitic. Syphilis, by destroying the bones, causes peculiar deformities in some parts, *e.g.*, flat nose, destruction of palate, etc. Syphilitic ozæna. Epilepsy from pressure of intra-cranial nodes. *Diagnosis.*—Ulcerations have characteristic syphilitic shape, appearance, and history. Syphilitic nodes are known by their position, hardness, indolence, and liability to nocturnal pains. *Prognosis.*—Good except in tertiary syphilitic ulceration; bad cases of this are sometimes quite incurable. *Treatment.*—*Vide* SYPHILIS.

BONE, MALIGNANT DISEASE OF.—True carcinoma of bone is said to be always secondary, never primary. Most so-called “cancers of bone” are sarcomata. For full details as to structure of “osteoid cancers,” see Walsham in “St. Bartholomew’s Hospital Reports,” vol. xv., and for full details as to clinical history of malignant tumors of bone, see Butlin’s lectures in *British Medical Journal* for July, 1880. Sarcomata of bone commence either centrally or subperiosteally. The latter are far more likely to recur and to infect the system than the former. The lower end of femur and upper end

of tibia are the most common seats of central sarcoma. The lungs are the usual seats of secondary infection. Both central and periosteal tumors of bone frequently become ossified (osteosarcoma, osteochondroma, etc.). However much the shaft of the bone may be affected, the articular cartilage remains healthy. Some tumors are perfectly encapsuled, others infiltrate every neighboring structure. The bone may give way at the seat of disease, a fracture thus resulting. When carcinoma of a bone does occur, it is usually encephaloid. *Diagnosis.*—*Vide* CANCER. Enchondroma and even cancellous exostoses sometimes resemble malignant tumors in their rapid growth. But they may be recognized by their hardness. *Prognosis.*—As above mentioned, central sarcoma is less likely to recur than periosteal sarcoma. Frequently no recurrence takes place after thorough removal, and these tumors occasionally reach a large size before infecting the system. *Treatment.*—Excise, except when disease has infiltrated regions which cannot be removed, *e.g.*, certain parts of the skull. Unless the tumor is evidently circumscribed, remove the whole bone. This generally necessitates amputation at the joint above. But in cases of disease of the lower end of the femur, it is not usual to exarticulate at the hip, that operation being so dangerous. Still, when the cancer is soft and diffuse, even this risk should be run.

TUMORS OF BONE.—The innocent are enchondroma, exostosis, cystic, fibrous, fibro-cystic, and hydatids. *Vide* the various articles, TUMOR, EXOSTOSIS, ENTOMOA, etc. The great majority of innocent tumors of bone are either exostoses or enchondromata.

ULCERATION OF BONE.—*Vide* CARIES.

CARIES.—*Causes.*—Predisposing are scrofula, syphilis, and constitutional weakness, such as arises from old age. Exciting cause, often some injury. *Symptoms* are those of osteitis leading to the formation of an abscess. When this opens, a probe can often detect the softened bone. If the probe will not reach the disease, the occurrence of certain deformities, *e.g.*, Pott's curvature, may offer a sure sign. Scrofulous caries usually attacks the vertebræ, articular epiphyses, phalanges, and metacarpal bones. Syphilitic ulceration affects mostly the tibia, cranium, sternum, hard palate, and nasal bones. *Diagnosis.*—In the early stage the bone may not be recognized to be diseased at all, or may be supposed to be merely rheumatic. *Prognosis.*—Ulcers of bone often cicatrize: bad cases not very hopeful. The younger the patient, and the less important the bone, the better the prognosis. Danger of amyloid disease, and fatty degenerations of important organs supervening. *Treatment.*—Constitutional for the scrofula or syphilis, etc. Local: rest, elevation, the usual treatment of inflamed bone at first, then that of chronic abscess. If the patient's general health be tolerably good, and the locality of the disease suitable, the carious bone may be removed by gouge, gouge-forceps, chisel, or Marshall's osteotrite. Use of strong or slightly dilute nitric or sulphuric acids. When a bone is

sufficiently diseased, resection (complete or partial) is sometimes justifiable, or amputation may be required, occasionally, to save life.

Boutonnière Operation.—A term applied to a proceeding in which a “button-hole” is purposely made in some part. It is done through the soft palate, to facilitate the extraction of polypi, and into the urethra from the perineum, in order to expose the commencement of an “impermeable stricture.”

Breast, Abscess of.—Three varieties: 1, supra-mammary; 2, mammary; and 3, post-mammary. Abscess in the breast almost always attacks suckling women in a feeble state of health, and generally soon after delivery. First variety is the most common in other people; subjects of third variety are often tuberculous. *Symptoms.*—General symptoms of abscess. Supra-mammary runs a quick course. Intra-mammary causes the greatest pain. Post-mammary pushes the whole breast forward: in it, too, the fluctuation is, at first, quite deep, and eventually several openings often form. *Treatment.*—On general principles. Deep abscesses should be opened as soon as fluctuation can be fairly felt. Line of incision should radiate from nipple. Attention to the general health will usually cure the fistulæ which often remain. Quinine.

Breast, Amputation of.—Scalpel, forceps, artery-forceps, sutures, sponges, dressings. Elliptical incisions parallel with fibres of pectoralis major; lower to be made first: separate gland from parts beneath before making upper incision. Proper support and pressure required from dressings. Drainage. Mortality, 10 per cent.

Breast, Atrophy of.—Occurs after middle age. It may be caused by the occurrence of new growths. Breasts apparently atrophied may perform their functions properly when called upon.

Breast, Cancer of.—Almost always scirrhus. May be encephaloid or colloid; or may be complicated with blood-cysts. *Causes.*—Obscure. Age, middle and later life, especially from 40 to 50 years. Cancer in youth mostly encephaloid. Sex—female. Depressing influences (?). Change of life (?). Injuries. Family predisposition.¹ Follows chronic eczema of the nipple. *Symptoms.*—Firstly, of scirrhus. A tumor, hard, nodulated, heavy. Implication of neighboring tissues, retraction of nipple. Affection of skin, which reddens and thickens, and afterward ulcerates; severe pain; cachexia; enlarged and hardened glands in axilla, afterward in neck; œdema of the arm; occasional direct infection of the pleura. Constitutional infection. *Encephaloid of Breast* begins as a soft oval tumor, usually deeply placed, grows rapidly, may be mistaken for abscess; feels like several soft tumors together; skin ulcerates; fungus; sloughing; bleeding; glandular infection, etc. *Diagnosis.*—*Vide* TUMORS OF BREAST. *Prognosis.*—Almost always recurs after removal. Average duration of

¹ This exerts much less influence than is commonly believed.

scirrhus, four years ; longer in old people. *Treatment*.—Palliative or operative. 1. Palliative : pressure by Arnott's bags, or soft compressor and bandages ; belladonna, atropine, and aconite externally ; poultices with belladonna. For ulcerated stage, carbolic lotion with oakum ; opium ; iodoform ; ol. eucalypt. ; terebene ; caustics for ulcerated surfaces. 2. Operation : prospects doubtful as to whether it will lengthen life or not. But Marrant Baker found in eighty-four cases, not operated on, duration of life to be forty-three months, and in sixty-two cases operated on, fifty-six and a half months. Operation certainly may be expected to free patient from much discomfort and distress. When fatal, it is usually because of erysipelas or pyæmia. Contra-indications to operation are, 1, considerable affection of skin ; 2, of glands in axilla, or even slight affection of cervical glands ; 3, affection of parts beneath breast ; 4, cancer in both breasts ; 5, great cachexia ; 6, constitutional infection ; 7, very chronic course in old people. Old age and weakness are not absolute contra-indications, nor is ulceration, *per se*. For operation, *vide* AMPUTATION OF BREAST.

FUNCTIONAL DISORDERS OF BREAST.—The milk may be excessive or deficient, or (3) it may flow away (galactorrhœa), or (4) may congest the gland. For galactorrhœa, tonics, iron, iodides ; externally, belladonna, hemlock (and internally too, with opium). When milk curdles, and forms hard lumps in the gland, use stimulating liniments.

GALACTOCELE.—A milk-tumor, caused by the dilatation or by the rupture of a duct. Always forms during lactation. At first fills and grows larger each time the child sucks ; fluctuation ; no pain ; no discoloration of skin ; afterward, fluid parts of contents tend to be absorbed. At this last stage, the main element in diagnosis is often the history. *Treatment*.—Incise or puncture with a trochar and canula, obliquely from nipple toward tumor.

HYPÆSTHESIA OF BREAST and NEURALGIA OF BREAST.—*Causes*.—Chiefly lie in state of uterus, ovary, or other organs of generation ; weakness ; "nervous temperament." Mostly young girls ; sexual depravity. *Symptoms*.—Pain, variable, often intense, shooting into arm, neck and back ; superficial tenderness, often exquisite ; sometimes redness and swelling ; swelling of nipple. *Diagnosis*.—Rests on age and character of patient, on variability of pain, and superficial nature of the tenderness, and on negative signs. *Treatment*.—Remove the cause ; if necessary, use the speculum, but avoid it if possible ; correct bad habits ; treat all disordered functions ; use the ordinary remedies for restoring the tone of the nervous system. Avoid handling and examining more than is necessary. Emp. belladon.

HYPERTROPHY OF BREAST.—Two forms, viz., 1, firm ; 2, pendulous and loose. *Causes*.—Unknown. Appears soon after puberty. *Symptoms*.—In form 1, the breast projects, large and firm ; in form 2, the organ hangs down relaxed, and may reach an enormous size. Both breasts generally

affected. Neuralgia often occurs with it. *Treatment*.—Not very successful. Support and pressure. In extreme cases, amputation may be done.

INFLAMMATION OF BREAST.—May occur even in infancy, but most cases occur in suckling women. *Causes*.—Debility; protracted suckling; the irritation of some disease of the nipple; obstruction to a gland duct; often coincident with defective nipple. *Symptoms*.—Lobular induration, perhaps owing to the obstruction of a duct: this is called a “lump, knot, or coring of the milk;” pain; tenderness; redness; shivering; feeling of illness. The signs of mere inflammation may disappear after involving more of the breast, or may give way to those of abscess. *Treatment*.—Locally: rest; support; warmth; moisture. If necessary, the milk had better be drawn off. General treatment: purgatives; quinine; belladonna locally; general rest also.

LOBULAR INDURATION OF BREAST.—See PAINFUL MAMMARY TUMOR.

MALFORMATION OF BREAST.—The breasts may be absent, or may be excessive in number; or they may occupy strange situations, *e.g.*, the back or groin.

TUMORS OF THE BREAST.—Under this head will be noticed such new growths as are not carcinomatous, *viz.*: 1, chronic mammary tumor, including “painful mammary tumor;” 2, cysts; 3, fibromata; 4, enchondromata; 5, osteomata.

1. *Chronic Mammary Tumor*—(Synonyms: *Adenoma*—“*Hypertrophie partielle*”—*Mammary Glandular Tumor*—*Hydatid Disease of the Breast* (Sir A. Cooper)—*Sero-cystic Sarcoma*).—The above names are not all strictly synonymous; some, such as adenoma, are applied to growths, which to the naked eye appear of a solid, fibrous nature; others, *e.g.*, sero-cystic sarcoma, are applied to tumors consisting chiefly of cysts with solid growths inside them. These latter are really of a sarcomatous nature; the true “chronic mammary tumor” is more of the nature of adenoma. *Causes*.—Age, most frequently from 20 to 30; great majority of cases occur in single women; “blows, squeezes, lacteal irritation,” “hysterical temperament,” “uterine irritation,” “sexual excitement of an irregular kind” (Erichsen). *Symptoms*.—Commence as a hard nodule, usually painless and not imbedded in the mammary gland, but movable; may be pedunculated; growth slow, but in rare cases very rapid; mammary gland may atrophy; almost always single; size, perhaps considerable in old tumors; tumors prominent, not attached to skin; afterward ulceration and fungation. *Diagnosis*.—1, *vide* Lobular Induration of Breast; 2, from cancer by (1) slow growth, (2) usual freedom from pain; 3, non-implication of skin; 4, healthy state of glands; 5, no retraction of nipple; 6, outline rounded; 7, consistence rather elastic than strong; 8, by mobility. When a fungus forms, the hole in the skin is clean-punched. *Prognosis*.—The true chronic mammary tumor usually grows slowly, and does not re-

turn if removed ; local recurrence is common in the case of the sero-cystic sarcoma. *Treatment*.—Absorbents, ointments of iodine and the iodides ; pressure by air-bags and spring contrivances : these means are praised by some, ridiculed by others. Excision ; the tumor may be simply enucleated, or in very bad cases, especially of the fungating sero-cystic kind, the gland may be removed as well.

Painful Mammary Tumor includes the cases often described as *Lobular Induration of the Breast*, or the term may be applied only to such “chronic mammary tumors” as are the subjects of severe paroxysmal pains. In *Lobular Induration of the Breast*, one or more lobes, or the whole breast, is thickened and hardened, but there is no tumor distinct from the breast, and the hard part does not project ; therefore, the hand laid lightly on the breast does not feel any tumor. Occurs mostly in single or sterile women ; age, from 25 to 45 ; pain often shoots along course of intercostal cutaneous nerves going to gland : tenderness on pressure over their course. *Treatment* for such painful conditions.—Support, if the breasts hang down ; pressure ; belladonna plaster ; the usual constitutional and local remedies for neuralgia ; attention to the generative organs, which are often functionally deranged.

2. *Cystic Tumor of the Breast* may be : 1, simple, or 2, multiple, or 3, combined with sarcoma, or 4, sanguineous, or 5, hydatid, or 6, milk-cysts. 1. Simple cysts vary greatly in size and in tension ; they may be so hard as to be mistaken for solid tumors ; diagnosis may be confirmed with a trochar and canula ; may arise from obstructed ducts. 2. Multiple cysts are rare, unless combined with solid growths. 3. Cysto-sarcoma : for its symptoms and treatment see Chronic Mammary Tumor, of which it may be regarded as one form, the other being adenoma. 4. Sanguineous cysts may cause bleeding from nipple. 5. True hydatids are very rare ; the term “hydatid disease” used to be applied to sero-cystic sarcoma of the breast. 6. Galactocele, *vide* above

3. *Fibromata*,

4. *Osteomata*,

5. *Enchondromata*, of breast, all extremely rare.

Male Breast subject to same diseases as female, but much less frequently attacked. For “Cancer of Male Breast,” refer, if necessary, to complete papers by Milton (“Medico-Chirurgical Transactions,” vol. xl.), and to Wagstaffe (“Pathological Transactions,” vol. xxvii.).

Bronchocele.—Two kinds : *ordinary* and *exophthalmic* goitre ; the former may be *endemic* or *sporadic*, *simple* or *cystic*, and it may be *acute*. *Causes*.—Immediate cause unknown, but certainly poverty and an unhealthy mode of living greatly conduce to it. *Character and Effects*.—Enlargement of the thyroid gland or part of it, fluctuating if cystic ; occasionally causes dyspnœa, dysphagia, or loss of voice, or displaces neighboring parts ; cysts usually contain serous fluid when single, grumous fluid when multiple. *Ex-*

ophthalmic Goitre.—Pulsation, anæmia, prominence of eyeballs. *Diagnosis* may have to be made from carotid aneurism. *Treatment*.—General hygiene ; high, dry, breezy places ; iron, iodine internally and externally ; iodide of potassium ; lead iodide and mercuric iodide ointments ; pressure ; tapping cysts and injecting them with iodine or iron tincture (3 j. to 3 ij. with water) ; pressure ; seton (dangerous) ; ligature of thyroid arteries ; excision when pressure of tumor threatens death ; for acute bronchocele, if the pressure gets dangerous, tap any cysts and divide the binding cervical fascia. D'Ancona claims to have cured a case of exophthalmic goitre by galvanization of the cervical sympathetic (*Dublin Journal*, February, 1878).

Bruise.—*Possible After-consequences*.—Abscess, contraction or shrivelling (e.g., of the ear after hæmatoma), permanent thickening, long-continued pain and tenderness, paralysis of nerve or muscle, necrosis or hypertrophy of bone, a weakness and liability to disease. *Treatment*.—Pressure, uniform, equable, and tight, especially by cotton-wool and starch bandage ; stimulating liniments, ice, cold lotions ; or, in severe cases, warmth and exclusion from the air. Rest. When the effusion remains, try friction, kneading or pressure, or tap antiseptically.

Bubo.—*Causes*.—Syphilis (suppurating bubo caused by the soft chancre), gonorrhœa, and any irritation about skin of external genitals. When there has been no visible sore, the bubo is called a "sympathetic" one. "Bubon d'emblée" means a syphilitic bubo from absorption of virus, without intermediate ulceration ; scrofulous constitution or severe local disease of genitals aggravates bubo. *Symptoms*.—Those of inflammation and sometimes suppuration of and around the inguinal glands ; suppuration may greatly undermine and destroy skin ; chronic or acute. *Diagnosed* from deeper abscesses by its connections, situation, history, and course. *Prognosis*.—Proper treatment will often prevent abscess ; liability to slough and open arteries. *Treatment*.—1, to prevent abscess : rest, counter-irritation, blisters, iodine-paint, ex. belladon. and glycerine on cotton-wool, pressure, cold, leeches. General treatment for cause : attend to bowels, quinine, iron. 2, when abscess forms : poultice, foment, then open freely ; destroy rotten skin ; stimulating ointments, red oxide of mercury powder or ointment, ung. resinæ, caustics when required ; iodoform.

Creeping Bubo heals at one side, extends at other ; horse-shoe shape.

Bunion.—Thickening of bursa over head of metatarsal bone of great toe ; occasionally the term is applied to any enlarged bursa on the foot. *Symptoms*.—First a tender spot, then swelling, effusion, liability to inflammation ; suppuration, sinus, large cavity with narrow orifice, thin discharge ; distortion of toe outward, displacement of flexor longus pollicis tendon in same direction ; changes like those of chronic rheumatic arthritis in the subjacent joint, or more serious articular disease which may lead to fatal inflammation of the foot ; may be starting-point of senile gangrene. *Prognosis*.—Rarely altogether curable when it has long suppurated.

Treatment.—Rest ; remove the pressure of the boot, which is always the cause ; restore the toe to natural position by mechanical contrivance ; it may be justifiable to divide tendons or ligaments ; corn plasters, soap plasters ; iodine or ointments of iodides to produce resolution ; when discharging, apply stimulating dressing, *e.g.*, ung. resinæ ; when inflamed, poultices, fomentations, etc. Nitrate of silver solution will harden tender skin.

Burns, including Scalds.—Six degrees : 1, cutaneous hyperæmia, like slight erysipelas ; 2, blistering ; no mark left after recovery, except occasionally a slight stain ; 3, true skin partly destroyed : cicatrix, but no contraction ; 4, total destruction of true skin : possible or probable great deformity ; 5, muscles, etc., destroyed ; 6, a whole thickness of a limb charred. *Symptoms* of the last four degrees are locally those of inflamed and suppurating wounds casting off sloughs. *Constitutional Symptoms.*—At first, those of shock or collapse ; then, within forty-eight hours, commences the second stage (of reaction and inflammation). The third stage (of suppuration and exhaustion) begins in about a fortnight. In the inflammatory stage there are fever, and liability to various complications, peritonitis, pleuritis, pneumonia, bronchitis, arachnitis, congestion of brain, ulceration of the duodenum. The symptoms of these special affections are not peculiar, but liable to be obscure. Third stage : hectic, same visceral lesions as those of second stage. Inflammations are of a low type. Erysipelas, pyæmia, and tetanus. Ulceration of the duodenum occurs most frequently in the second stage, and is found in 12 per cent. of fatal cases of burns : its symptoms are epigastric tenderness (not a valuable sign) and hemorrhage from the anus. *Prognosis.*—Depends on age, extent of surface injured, and, to a less degree, upon depth. Most serious in young children. *Treatment.*—Locally : rest ; protect part from air ; cotton wadding, oil, linseed-oil and lime-water, zinc ointment ; or rags dipped in and kept constantly wet with solution of silver nitrate (gr. x. ad 5 j.), or with a concentrated solution of carbonate of soda ; starch, flour, balsam of Peru, etc. Afterward the treatment of simple ulceration. Guard against contraction from cicatrization. *Vide* CICATRIX. Terebene, carbolic lotion, and oakum for offensive discharges. Don't irritate by dressing too often. Constitutional treatment : in stage of collapse, opium, morphia subcutaneously, full doses ; stimulants cautiously ; warmth ; chloroform if necessary at first dressing. In later stages watch for and, so far as the patient's state admits, treat the complications. Warmth externally for convulsions. Opium for diarrhœa, but keep the bowels regular. Bloodletting sometimes for the visceral inflammations. Diet chiefly of milk. Judicious stimulants, good food and tonics often indicated ; fresh air.

Bursæ.—Situations of chief : acromion, olecranon, great trochanter, tuberosity of ischium, beneath psoas, lower, superior, and outer parts of

patella, condyles of femur, popliteal space, tuberosity of tibia, and the os calcis. They also occur on almost any hard prominence, especially if subject to pressure, and under any tendon which glides over bone.

DISEASED CONDITIONS OF BURSAE.—Four, viz.: 1, simple enlargement with fluid contents; 2, enlargement and solidification; 3, enlargement and formation of melon-seed bodies; 4, inflammation. As a type of all bursæ, let us take the

BURSA PATELLÆ.—All the above diseases may occur here, and are the result of undue and repeated pressure. Inflammation may follow a blow only, but especially a blow on bursa already enlarged. 1. *Simple Enlargement.*—A globular swelling, obviously in front of patella or lig. patellæ, and therefore not in the joint. Fluctuation sometimes, or even transparency. Usually painless. Stiffness. Perhaps no trouble whatever. 2. *Solidification.*—May be judged by the feel, or detected after incision. 3. *Melon-seed bodies* may cause a crackling feel. 4. *Inflammation* causes heat, redness, etc., and leads almost always to abscess. *Treatment.*—For 1. Remove cause, iodine or blistering externally, tapping simply, or with injection of tincture of iodine (3 j.); seton; free incision with gentle but firm compression. 2. Excise the solid bursa. In dissecting it out, remember the absolutely close proximity of the joint. 3. Melon-seed bodies are to be let out by incision if the bursa is troublesome. 4. For inflammation—leeches, fomentations, poultices, rest, elevation, back-splint. When abscess forms incise freely. Suppuration may cause cellulitis all about knee, bursting of pus into neighboring tissues or joint, or disease of patella. Enlarged bursa over *olecranon* often causes diffuse cellulitis of forearm. Bursa in *popliteal space*, and beneath *semi-membranosus*, very liable to communicate with knee-joint. Hence caution in tapping; antiseptic. Enlarged bursa with liquid contents can be easily reduced by elastic pressure. But this elastic pressure requires experience and care to be used with perfect safety.

Calculus.—*Urinary Deposits.*—Table of two classes, organic and inorganic:

Name.	Characters.	Causes.	Symptoms.	Treatment.
Urates or Lithates of Ammonia and Soda.	Pinkish yellow, red, or lateritious (brick-dust) sediment; urine scanty, acid, and high-colored. The precipitate, before subsiding, forms a cloud in the urine, which clears off when heated.	1. Rapid waste of tissues, <i>e.g.</i> , as in fevers; 2, excess in nitrogenous food; 3, dyspepsia; 4, obstructed perspiration; 5, congestion of the kidneys (Golding Bird). Also imperfect respiration. Cold weather will precipitate urates sometimes from healthy urine.	Those of the causes. Sometimes also a slight burning feel in passing water.	Treat the causes. Moderate animal food. Plenty of exercise, fresh air, particular attention to the digestion, etc. Friedrickshall and Vichy waters.
	Crystalline form—uric acid, mostly rhombic prisms and plates. "Gravel."			
Urates.—Minute spheres with acicular spiculæ of uric acid projecting from them.				

ORGANIC AND INORGANIC CALCULI—(Continued).

Name.	Characters.	Causes.	Symptoms.	Treatment.
Oxalate of Lime.	Crystalline forms: 1, quadratic octahedra; 2, dumb-bell crystals.	"Nervous exhaustion;" dyspepsia; overwork: mental distress; excess of saccharine food or alcoholic liquors.	Those of the causes. Occasionally, loss of sexual vigor, or disorder of the sexual functions.	Treat the causes. Regular diet, exercise, etc. Mineral acids.
Phosphates.	1. <i>Phosphate of Lime</i> .—White, cloudy mass. Crystals: spherules, dumb-bells, rosettes, oblique hexagonal prisms. 2. <i>Phosphate of Ammonia and Magnesia (triple phosphate)</i> . Crystals (large): triangular, truncated prisms, four-sided prisms, irregular six-sided plates; stellate crystals when ammonia has been added.	Alkaline urine is the immediate cause. It is caused by injuries and diseases of the bladder, especially paralysis and catarrhal inflammations; renal inflammation; spinal injury or disease. Nervous exhaustion; excessive use of alkalis; the alkalinity of the urine is said to result from the metamorphosis of urea into carbonate of ammonia.	Urine is offensive, and often contains m u c o - p u s. Signs of causative disease.	Treat the causes. See DISEASES OF BLADDER, etc.
Carbonate.	Small and delicate crystalline spherules. Drum-sticks.	The causes which determine the change of urea into carbonate of ammonia.	No special symptoms known. Deposit rare.	Treat the conditions which accompany it.
Blood.	Urine a dirty red color; after standing, a slightly flocculent, brownish sediment. Heat coagulates the albumen. There may be blood enough to form a clot; then the urine is dark brownish red. Or the blood may be quite un-mixed with the urine.	1. Kidney disease. Calculi, congestion, inflammation, injury, scurvy, the <i>Bilharzia capensis</i> . Malaria may cause intermittent hæmaturia. Blood from the kidney is generally mixed uniformly with the urine, and forms blood-casts. 2. Bladder affections: injuries, stone, tumors. Blood from bladder often flows pure <i>after</i> the urine. 3. Urethra: blood pure, and comes before or with urine, or without urine at all.	Those of cause. Use Heller's test for blood. Heat urine, then add KHO and heat again. The phosphates then fall down with the coloring matter of the blood. The sediment has a dirty red color by reflected, and a splendid blood-red color by transmitted light.	Rest and internal styptics, e.g., gallic and sulphuric acids, acetate of lead with opium. Dry cupping the loins also in renal hæmorrhage. For vesical hæmorrhage use similar treatment and local remedies: ice to perineum and epigastrium and in rectum. Do not catheterize unless there is retention of urine. If the clots will not come away without interference, use, cautiously, Clover's exhausting apparatus for lithotomy, or a syringe and full-sized catheter. Ruspi-ni's styptic.

Name.	Characters.	Causes.	Symptoms.	Treatment.
Pus.	Pus-corpuscles, under the microscope, are spheroidal and granular. The pus generally subsides as a dense layer of a "pale greenish cream-color," which can be mixed thoroughly with the urine by shaking. Not affected by acetic acid. Forms a translucent jelly when liquor potasse is added. The urine is albuminous.	Abscess, ulceration, or merely catarrh of any part of the urinary passages. 1. Pus from the kidneys is usually diffused throughout urine passed. 2. Pus from bladder is mostly mixed with mucus. 3. Pus from an abscess is usually variable in quantity, and not equally diffused.	Those of the cause.	Treat the cause.
Epithelium.	Epithelial cells lining urinary passages. See works on general <i>Anatomy</i> . Often in form of casts.	Kidney disease. Ulceration or catarrh of bladder.	Those of cause.	Treat cause.

Fibrine is sometimes present in the form of flocculi. Or it may form fibrinous casts of the tubuli uriniferi. For information about casts, *vide* medical works on the kidney. Echinococcocysts are sometimes found in the urine. Give turpentine in large doses. The above table has been constructed chiefly with the aid of Thompson, Druitt, and Niemeyer. In cancer of the bladder cancer-cells and débris are sometimes found in the urine.

Calculi.—There are seven mineral substances of which urinary calculi may be formed. A calculus may consist of several of these materials in layers, or of one only. 1, Lithate of ammonia; 2, lithic or uric acid; 3, oxalate of lime; 4, xanthic or uric oxide; 5, cystic oxide; 6, phosphate of lime; 7, triple phosphate. For the causes of the presence of an abnormal amount of some of these substances in the urine, see table of urinary deposits. The nucleus or centre of each calculus may be formed first in the kidney or in the bladder, or it may be a foreign body. Poverty, certain localities, and the male sex are great predisposing *causes* of stone in the bladder. Negro race remarkably exempt.

TABLE OF CALCULI.

Name.	Physical Characters, etc.	Chemical Characters.
Lithate of Ammonia.	Occurs rarely, except in children. Gray, smooth, dusty, non-laminated appearance.	Soluble in boiling water. Add HCl to solution and you get a precipitate of uric acid. Heat with potassium carbonate: ammonia escapes. Blow-pipe burns it away.
Uric Acid.	Smooth or warty. Yellowish or brownish. Concentric structure.	Gives off no ammonia when heated with KHO. Evaporate to dryness with nitric acid. Cool, and add a little NH ₃ ; the characteristic deep purple-red murexide is then obtained. Blow-pipe burns uric acid away.

TABLE OF CALCULI—(Continued).

Name.	Physical Characters, etc.	Chemical Characters.
Oxalate of Lime.	Rough, warty, "mulberry" appearance. Very hard. Dark "blood-stained."	Easily soluble in nitric acid. Boil long in a solution of potassium bicarbonate, neutralize carefully with nitric acid; then white precipitates can be formed with solutions of lime, lead, or silver. Blow-pipe reduces it, first to calcium carbonate, then to quick-lime. Heat on platinum foil and it chars. Then add HNO_3 and it effervesces.
Cystic Oxide.	Has a wavy appearance, especially when fractured. Changes color with age from pale yellow to brown, gray, or green. Extremely rare. Contains sulphur.	Dissolves, in great part, in ammonia: its solution then deposits, by spontaneous evaporation, six-sided prismatic and tubular crystals. Dissolve in strong caustic potash. Boil, and add a little solution of lead acetate: a black precipitate of sulphate of lead falls.
Xanthio Oxide.	Section, lustrous bright brown. Most extremely rare.	Has a peculiar deep yellow color, when its solution in nitric acid is evaporated to dryness; characteristic.
Mixed Phosphates of Lime.	Chalky, soft, brittle, laminated.	"Fusible calculus": melts in the blow-pipe flame. Dissolve in nitric acid and add excess of ammonia: white precipitate.

Phosphate of lime and triple phosphate very rarely occur separately.

Fibrinous calculi smell of burnt feathers when burnt, and are stained bright yellow by nitric acid.

Uric acid forms the nucleus of most "alternating" calculi.

The nature of the stone, while still in the bladder, may be guessed at by considering the urine and any deposit from it. The urates are formed from acid, the phosphates from alkaline urine (*vide* Table of Urinary Deposits).

Symptoms of calculus in the bladder.—(Often so trifling as to attract no attention for a long time.) 1, *Pain* radiating from bladder to perinæum and in glans penis, especially after micturition; 2, riding or *jolting* may aggravate the pain by shaking stone about; less pain when prostate is much enlarged; 3, *urine sometimes stops flowing suddenly*; 4, *frequent micturition*; 5, in children, *incontinence* of urine; 6, *blood* in urine; 7, signs of *vesical catarrh*; 8, prolapsus ani; 9, priapism. Many of these symptoms are often absent. For physical signs we employ the process called

Sounding.—The sound should have a short, sharply curved beak, and is best hollow. Warm, oil, and introduce. Hold lightly and gently. Push backward and forward, and from side to side. Then turn point downward, to examine base of bladder. The finger in the rectum, or suddenly letting the urine flow through the sound will sometimes assist. Points to be ascertained: 1, presence or absence of stone; 2, size; 3, number; 4, nature; 5, whether the stone is encysted or not; 6, state of bladder as to

rugosity. Size and number are best found by seizing and measuring with a lithotrite. Nature best judged by considering the urine and the patient's age and constitution. *Fallacies* result from mistaking a fasciculated bladder or the feel of some bony pelvic prominence for a calculus. The stone should be heard as well as felt. A stone may be hidden away in a sacculus. It there keeps always in one position, and perhaps is only felt occasionally or not at all. "The surgeon should always remember that when irritation at the neck of the bladder arises from stone it is referred to the glans penis; when from disease of the bladder, to the organ itself; and when from disease of the prostate, to the perinæum or rectum" (Bryant).

Treatment.—1, Palliative: treat the complications, *e.g.*, vesical catarrh; recumbent position; decoction of triticum repens. 2, Operative: as lithontripsis is not yet of any value, refer to articles LITHOTOMY, LITHOTRITY, and LITHOLAPAXY.

CALCULUS IN THE KIDNEY.—*Causes.*—*Vide* Table of Urinary Deposits. *Position.*—They may occur as small infarctions in the tubules, or as stones of various sizes, single or multiple, in the pelvis and calyces, often forming a cast of the pelvis and its offsets. *Symptoms and Course.*—Pain in the back; blood, pus, or "gravel" in urine; sometimes intense pain (renal colic), caused by passage of a calculus down the ureter into the bladder; pyelitis. *Treatment.*—When an abscess forms it has been found sometimes practicable and justifiable to cut down upon and remove the stone. For the renal colic, use opium boldly, chloroform, and warm baths.

CALCULUS IN THE PROSTATE.—*Origin:* either descends from bladder, or forms first in prostate. Number, 1 to 100; size, grain of sand to cherry-stone; faceted; color, various; consistence, various; structure, usually concentric layers; chemistry, phosphate (rarely carbonate) of lime; position, projecting into or near the urethra usually, but sometimes near circumference of gland, and occasionally even partly in bladder and partly in prostate. *Symptoms.*—Those of irritation, inflammation, or abscess of the prostate, according to their effect; semi-erection of penis, and difficulty in seminal ejaculation. Calculus can possibly be felt by sound in the urethra or finger in rectum. *Treatment.*—Remove, if possible, by urethral forceps, or operate as for median lithotomy; but do not operate when the calculi are small, very numerous, or only to be felt per rectum. When operating, see if there be any calculus in the bladder also.

CALCULUS IN THE URETHRA.—Usually descends from bladder, but may be formed *in situ* (then usually behind a stricture). *Symptoms.*—Pain, obstruction, or retention of urine. If not relieved, dilatation of urethra, extravasation, abscess, and urinary fistula, through which stone may pass. *Treatment.*—1, Push forward with finger and thumb; 2, extract with urethral forceps, wax bougie, or some specially devised instrument, if necessary slitting up meatus urinarius; or, 3, push back stone to posterior part

of urethra, and do median lithotomy. If there is not serious obstruction, a little patience will sometimes allow the urine to wash the stone right to the meatus within twenty-four hours. In other cases delay is highly dangerous.

CALCULUS IN FEMALE has, besides many of those of male, these *special symptoms*, viz.: 1, bearing-down pains; 2, incontinence of urine. *Diagnose* carefully from uterine disease, by sounding and vaginal examination. *Prognosis*.—Liability to ulceration into vagina, and consequent vesico-vaginal fistula. *Treatment*.—Remove calculus. Three classes of methods, viz.: 1, urethral dilatation; 2, lithotritry; 3, lithotomy. The dilatation is best done with a screw three-bladed dilator (*vide* also articles **LITHOTOMY** and **LITHOTRITRY**). Danger of incontinence if the urethra is dilated too much. The limits of size for dilatation should be a diameter of one to one and a half inch for adults, and half as much for children. *Slow* dilatation almost always followed by incontinence (refer to Walsham, "St. Bartholomew's Hospital Reports," vol. xi.).

Cancer.—The term is commonly used as if synonymous with "malignant," and therefore including other new growths besides "carcinomata." *Characters of Malignancy*.—A cancer tends to 1, infiltrate neighboring tissues; 2, recur; 3, affect lymphatic glands; 4, be followed by secondary deposits; and if the cancer be left long enough, all these four events are pretty sure to take place. Cancers also tend to soften and ulcerate, and "there is scarcely a tissue or an organ which they may not invade." *Causes*.—There can be little doubt but that hereditary influence has some effect in this as in the liability to most other diseases. Still the cancer at its origin is probably local, and various local irritations, such as blows, smoking clay pipes, decayed and rough teeth, etc., can often be traced as exciting causes. Soft cancer occurs chiefly in youth, hard cancer in middle age. It is certain that affections at first pure chronic inflammation in their nature sometimes pass into cancer. *Symptoms*.—Those of a new growth differing from an innocent tumor in more or less of the following characters: 1, it tends to infiltrate; 2, to involve neighboring tissues; 3, to attack neighboring lymphatic glands; 4, it grows more rapidly than innocent tumors; 5, it is usually more painful; 6, it tends to soften and ulcerate; 7, it has the peculiar features of one of the varieties of cancer. *Prognosis* (*Vide* **CANCER OF BREAST**, etc.).—Epithelial cancers kill, on the average, in fifty-three months; scirrhus in thirty-two (Sibley). Soft cancer is still more rapid. Cancer kills by, 1, hemorrhage; 2, interference mechanically with vital organs; 3, general infection of blood and consequent cachexia, etc. *Histology*.—Every cancer consists of cells lying in the interstices of a network of fibrous tissue; the network may be close or open, strong or weak; the cells are of two kinds: one, the larger, are of epithelial origin; the other, the "small cell formation," of connective-tissue origin. It may here be mentioned that the cells of a sarcoma are all of connective tissue

origin, and primarily directly connected with the mesh-work in which they lie (*Vide Special Varieties of Cancer*). Cancer-juice is fluid containing cancer-cells and often oil-particles and débris. *Varieties of Cancer*.—Some of the sarcomata, and, indeed, exceptionally almost any kind of tumor may have most of the characters of malignancy. In these cases, the characters are usually so modified as to cause a condition spoken of as “semi-malignant.” But most cancers are *carcinomata*. There are five varieties of carcinoma, viz.: 1, hard; 2, soft; 3, colloid; 4, squamous (ordinary) epithelial; 5, cylindrical epithelial cancer; besides villous, melanotic, and osteoid cancers.

CANCER, HARD—SCIRRHUS.—The fibrous part preponderates over the cell elements. *Pathology*.—Hard, section concave, white or gray, dotted with yellow points; no defined margin; juice. Either tuberosus or infiltrating; “tuberosus” means “forming a distinct nodule.” When infiltrating, the neighboring parts are hard, adherent, and often drawn in; infiltration of skin with tubercles, a very valuable clinical symptom. Parts of the cancer often atrophy, or even slough. The cancerous ulcer is irregular, fetid, with thick, hard edges. *Locality*.—Breast, skin, rectum; found also in testicle, tonsil, eye, etc.

CANCER, SOFT—ENCEPHALOID.—Fibrous part small; cells abundant; special characters of other varieties absent; not distinct in nature from scirrhus. If a scirrhus be removed, cancer often recurs as encephaloid. Consistence, often as soft as, or even much softer than, brain; color, white, creamy, or blood-stained. When connected with bone or periosteum, liable to contain bony plates or even a complete bony framework; often contains large blood-cysts; may be encapsulated; soft and fluctuating. Puncture lets out blood and often cancer-juice as well. May ulcerate and fungate as a bleeding mass; grows fast, and is covered by large cutaneous veins, owing to its obstructing deeper veins; large vessels and nerves not generally compressed; amount of pain, variable; “cancer of young life.” *Locality*.—Bones, female breast, eye, testicle; attacks also uterus, bladder, etc.

CANCER, COLLOID—ALVEOLAR CANCER.—Its carcinomatous nature doubtful; consists of a stroma of wide meshes, with rounded or oval nuclei; meshes contain a jelly-like substance, besides cells, some of which have concentric laminae like an oyster-shell; to the naked eye this cancer has a markedly jelly-like appearance. *Locality*.—Peritoneum, ovary, breast, limbs, parotid, rectum; in alimentary canal, it is said to arise from Lieberkühn's follicles.

CANCER, SQUAMOUS EPITHELIAL, or ordinary epithelioma.—Least malignant of the carcinomata; cells flattened like those of epidermis; tendency to arrange themselves in “nests.” First appearance, usually a hard lump or wart, which may be dry for a long time, but usually ulcerates sooner or later. Ulcer has hardened, elevated edges, and often an excavated base;

occasionally cauliflower-like ; glands slow to be affected ; infection of the system slower still. *Locality*.—Places where skin and mucous membrane meet, *e. g.*, lips, eyelids, anus, etc. ; also warts on the skin, back of hand, front of leg, prepuce (from irritation of soot), tongue. Life usually destroyed by local causes. Cancer should be removed, even if glands are somewhat enlarged, for the enlargement may be merely the result of irritation or inflammation. If done early, there is fair hope of non-recurrence.

CYLINDRICAL EPITHELIAL CANCER occurs in mucous membranes. Both primary and secondary deposits contain cylinders of cylindrical epithelium, like the structure of mucous membrane itself.

VILLOUS CANCER.—*Vide* DISEASES OF BLADDER.

OSTEOID CANCER.—Here not only the primary tumor has a skeleton of bone, but bone also appears in the secondary deposits.

MELANOTIC CANCER is simply cancer with deposits of pigment in the cells. Its primary seat is usually a part originally highly pigmented, *e. g.*, a dark mole. May be either carcinoma or sarcoma.

Treatment of Cancer.—Constitutional. Tonics, especially iron. Anodynes necessary in later states. Diet ample and nutritious. *Local treatment*.—Support and rest when not actively interfering with it ; layer of cotton-wool and bandage ; iodine, opium, and lead retard growth of tumor ; amadou plaster ; for sloughing, a bread poultice with powdered charcoal ; terebene ; wash ulcers with a weak solution of zinc chloride and laudanum ; tepid lotion of chlorate of potash to be used frequently ; lotion of citric acid said to be sedative to epithelial cancers. For œdema of a limb caused by pressure, soft bandages. For hemorrhage, perchloride of iron, or ligature of any bleeding artery, or bathing with water as hot as it can be borne. For pain, extract of belladonna with glycerine, locally. Apply to a painful cancerous sore morphia and glycerine on lint, or iodoform ; chloral or morphia internally. Question of operating.—Objects of operation—1, to prolong life ; 2, to give an interval of ease and usefulness. Reasons for not operating—1, unhealthy condition of patient, *e. g.*, severe kidney or lung disease ; 2, diffuse and wide infiltration of a cancer ; 3, cancerous cutaneous tubercles ; 4, disease of glands which cannot themselves be removed ; 5, considerable adhesion of a scirrhus breast to pectoral muscle ; 6, more than one tumor (except in rare and chronic cases) ; 7, cancers beneath scalp. If the conditions are favorable, the sooner the cancer is removed the better. It should be removed freely, the neighboring parts carefully examined, and, in many cases, treated with caustics, *e. g.*, zinc chloride (gr. xx. to $\frac{3}{4}$ j.). Suspicious glands should be removed entire. Ecraseur instead of knife in cancer of tongue, neck, or uterus, etc. ; galvanic cautery to cancers of skin ; caustics ; Maissonneuve's caustic arrows ; injection of dilute acetic acid (1 to 3), its efficacy doubtful. Injection of bromine in alcohol (℥. v. to $\frac{3}{4}$ j.). Esmarch and Billroth have treated cancer with some success, by increasing doses of arsenic, long continued.

Cancrum Oris (or Gangrenous Stomatitis).—A phagedenic ulceration of the cheek in childhood (second to eighth year). *Causes*.—Usually a sequel of one of the exanthemata; low, damp lodgings, bad air, food, etc.; mercury to excess in feeble constitutions. *Symptoms*.—Mild form marked by small gray, sloughy, foul ulcers on inside of cheek, with red gums and foul breath. The typical form presents a slough reaching right through cheek; skin white, swollen, hard, with a red blush in centre. Internally, a foul, sloughing ulcer, opening into mouth; foul odor; gums swollen and ulcerated. Child suffers little, and dies comatose. Peculiar moving bodies in blood in a case of noma; 'virulent infectiousness of such blood (Sansom). *Prognosis*.—Of the severe form, only one in twenty recovers. *Treatment*.—Support strength by enemata if necessary; nitric acid freely to sloughing parts; chlorate of potash lotion to mouth: quinine internally.

Carbuncle.—*Causes*.—Occurs chiefly in men over forty-five. Diabetes; debility; (see also BOWLS). *Character*.—Inflammation of skin, and cellular tissue beneath. May begin with a small pustule, but essentially proceeds from a non-circumscribed sloughing of cellular tissue. Brawny, painful swelling; suppuration; formation of several openings; destruction of all affected parts down to subjacent muscles and tendons—then gradual healing and cicatrization. Constitutional disturbance more or less severe; blood-poisoning; sometimes death from pyæmia, less frequently from exhaustion. *Treatment*.—Support strength with tonics and good diet; fresh air; crucial incision (??); subcutaneous incision; pressure by strapping with plaster; caustics; destroy the centre of the carbuncle (about one-fourth its area) by caustic potash; strong carbolic acid. Paget recommends emplastrum plumbi on leather, with a small hole in the middle, for small carbuncles, and resin cerate under a poultice for larger ones. Danger of hemorrhage when incisions are made.

CARBUNCLE, FACIAL.—Carbuncle attacking face, especially lips, is particularly dangerous. It is so, probably, from causing phlebitis, which extends to the cerebral tissues. There is swelling of the cheek and nose, and exophthalmia. Fatal cases present also symptoms of pyæmia. Prompt incision, and quinine to cinchonism recommended.

Castration.—Required for malignant or other hopeless disease of the testicle. Scalpel; forceps; artery-forceps; catgut ligature for scrotal vessels; whipcord ligature for cord; suitable dressings. Hold testicle in left hand, so as to tighten the scrotum; incise skin, etc., from external abdominal ring to bottom of scrotum, so as to expose testicles; pull down the cord, and put whipcord ligature right round it. In cancer cases, dissect upward, and tie cord as high up as is safe. Cut cord a quarter of an inch below ligature; a touch or two of knife then liberates testicle. *Prognosis*.—Operation very safe. Peritoneal process has been opened in a child, causing fatal peritonitis.

¹ Noma is a gangrene of the genitals of female children, analogous to cancrum oris.

Catheterism.—See STRICTURE OF THE URETHRA.

Cellulitis.—See Erysipelas.

Cephalhæmatoma.—A blood-extravasation, caused in child-birth. Two kinds: 1, between aponeurosis and pericranium; 2, between pericranium and skull. Former is diffuse: the latter is circumscribed and small, and never extends across a suture. Treat on general principles.

Chancre.—See SYPHILIS.

Cheek, Congenital Fissure of.—Extremely rare. Accompanied by imperfect development of external ear. Treat by methods used for hare-lip.

Cheloid.—Two kinds: 1, Cheloid of Alibert. A fibrous or fibro-cellular outgrowth from a cicatrix, forming a tubercle, at first pink, afterward whitish. Tends to disappear spontaneously, especially in youth.¹ *Treatment.*—Excise if hard and unsightly, or following puncture of the lobule of the ear for earrings. Very liable to return. 2. "True Cheloid" of Addison. "Not a tumor at all; but a patch of hide-bound skin, in which the skin, fascia, and muscles are adherent together, and the surface is yellowish and covered with scales" (Holmes).

Chest, Injuries of.—Divided into (1) non-penetrating, (2) penetrating. Wounds of the soft parts present nothing special. Rupture of the pectoral muscles sometimes takes place, as, for instance, by a falling man catching at some support in his descent. For Fractures of the Ribs and Sternum, *vide* article FRACTURES.

CHEST, PENETRATING WOUNDS OF.—These will be noticed, according to the parts injured, under the following heads: 1, wound of pleura; 2, wound of lung; 3, hernia of lung; 4, wound of pericardium; 5, wound of heart; 6, wounds of certain blood-vessels.

1. *Wound of Pleura.*—Rarely occurs without wound of lung. May present all the local symptoms of wound of lung, except that any air expelled from the wound by respiration is not churned up with blood into fine froth. Such air must, of course, have entered the pleural cavity from without the chest. *Treatment.*—As for wound of lung.

2. *Wound of Lung.*—*Signs.*—Escape of air from wound, often churned up with blood into froth; pneumothorax; hæmothorax; cough; blood and bloody froth coughed up; emphysema. *After-consequences* (both of this and the preceding injury).—Pleurisy; pneumonia; hydrothorax; empyema. *Prognosis.*—Bad, but very far from hopeless. If a week passes over, hope is considerable. *Treatment.*—Perfect rest in bed on injured side; strap chest; dress antiseptically; low diet; give iced milk; avoid stimulants, even to remove collapse. Collapse helps to stop hemorrhage, which is the first great danger. If pulse rises, or inflammation threatens, bleed. *Vide* also PNEUMOTHORAX, EMPHYSEMA, etc.

¹ See Clinical Society's Transactions, 1880, p. 61.

3. *Hernia of Lung*.—Two kinds: 1, primary; 2, consecutive. Consecutive comes on when the wound has healed. Primary should be reduced so long as the lung-tissue is healthy and uninjured. Consecutive can only be guarded by a shield.

4. *Wound of Pericardium*.—*Signs*.—1, A likely position and direction of wound; 2, those of hemorrhage and shock; 3, those of pericarditis, viz., friction-sound, extended dullness on percussion, "thoracic oppression," dyspnoea, anxiety, etc. Pulse small and frequent. *Prognosis*.—Not absolutely hopeless. *Treatment*.—Cold locally and internally; perfect rest; venesection; digitalis and belladonna.

5. *Wound of Heart*.—When death is not instantaneous, the above remarks on wound of pericardium apply to those of heart, only the signs are more severe. Tremor of the heart and disturbance of its action are more marked. When death is instantaneous, patient either leaps up or falls down, often uttering a shriek. A patient may live for years, even with a foreign body in his heart.

6. *Wounds of Thoracic Blood-vessels*.—Those of aorta and vena cava usually at once attended by fatal hemorrhage. *Intercostal* and *internal mammary* arteries. Usually recommended not to attempt ligature, but to trust to rest, cold, etc. Vanzetti's "uncipression." But "Surgical History of War of Rebellion" says that these wounds demand "the rigorous application of the rules for the management of wounded arteries, the exposure of the bleeding point, and a proximal and distal ligature." In wounds of the chest, with lodgement of foreign bodies, it can rarely be advisable to make any dangerous search for them. Always consider instrument wounding, and direction of wound.

CHEST, VISCERA INJURED WITHOUT EXTERNAL WOUND.—Rare. Signs, treatment, etc., may be inferred from notes above.

Chilblains.—Inflammation of skin owing to sudden change to or from a frosty temperature. Occurs usually in females and children with feeble circulation. Congestive stage and ulcerated or broken stage. Itching. Symptoms aggravated by warmth, dietetic indulgence, and approach of evening. *Treatment*.—Regular and free exercise, fresh air, healthy living, well-fitting boots, straw or cork "socks" in soles of boots. Locally, in first stage, stimulating liniments, friction with snow, painting with iodine, or solution of sulphate of copper (gr. iij. to ʒj.) In broken stage, use water-dressing at first, afterward collodium flexile or Peruvian balsam. Small doses of laudanum, frequently repeated, stimulate the capillary circulation.

Chloroform.—*Vide* ANÆSTHESIA.

Cholecystotomy.—The gall-bladder has been excised by Marion Sims; result fatal. George Brown tapped the gall-bladder successfully.

Cicatrices.—Liable to neuralgia, contraction, ulceration, cheloid, epithelial cancers, besides other rarer affections.

CICATRICES, NEURALGIA OF.—May arise from implication of a nerve, or the bulbous end of a nerve in a contracted cicatrix. Separate the cicatrix from the parts beneath, or, if necessary, excise the end of the nerve. If such a cause cannot be found, treat on general principles.

CICATRICES, CONTRACTION OF.—Is a natural process, and results from the escape of water from a new scar as it dries up and atrophies to ordinary connective tissue; most frightful deformities often result. *Treatment.*—1, Preventive; hasten healing of large wounds by skin-grafting; prevent contraction during and for some time after cicatrization by splints and bandages. 2, Curative; divide carefully the contracted bands; keep the wound stretched during recicatrization; graft; transplant large piece of skin in suitable cases. When the contraction is merely linear, a V-shaped incision can be made, and when the tongue of skin thus formed retracts toward its base, the two outer sides of the V-shaped wound should be sewn together at and near the apex of the V. Pressure by strapping will weaken and make thin a thick cicatrix.

CICATRICES, ULCERATION OF.—Very liable to occur, especially in lower extremities, and in old and feeble people. Such cicatrices should be protected from friction and damp. *Treatment.*—Stimulant applications; rest; good living.

CICATRICES, WARTY (that is, indurated and thickened).—May be blistered or painted with iodine. Do not mistake epithelioma for these.

CICATRICES, CHELOID OF.—*Vide* CHELOID.

Circumcision.—Done for phimosis in children and for various diseases of the prepuce and glans penis in adults. With the penis in its natural position, apply a pair of long-bladed polypus-forceps exactly on a level with the corona glandis, but inclined slightly forward rather than perpendicularly; as the glans slips back, compress the prepuce with the forceps; then slice off prepuce close to the forceps; slit up mucous membrane with scissors right to glans; stitch mucus flaps to skin-flaps; check hemorrhage. In infants, instead of sutures, merely wrap a piece of lint round behind corona and also over all the parts. *Prognosis.*—Fatal result extremely rare.

Cirsoid Aneurism.—*See* ANEURISM.

Clitoris, Hypertrophy of.—Occasionally large size; danger of hemorrhage when removing it.

Club-foot.—Four types: 1, talipes varus; 2, talipes valgus; 3, talipes equinus; 4, talipes calcaneus. Talipes equino-varus (a combination of 1 and 3) most common. *Causes.*—The cause of congenital talipes varus, or equino-varus, is arrested development. At the commencement of their development, the lower extremities are so placed that, if extended, the feet would point backward; hence they have afterward to rotate on their axes; when this rotation is not fully accomplished in the foot, club-foot results. Talipes valgus is only another name for flat-foot, which results from excessive standing or

walking when the general strength is small ; the muscles, being then weak, do not sufficiently assist the ligaments, which give way to the strain. Infantile paralysis leads to equino-varus, because that is the position in which gravity places a foot uncontrolled by healthy muscles. *Symptoms.*—*Pure varus.*—Very rare ; in it, only inner border of foot is raised, and anterior part of foot is bent inward on posterior half. *Equino-varus.*—In this, the heel is more or less raised ; in severe cases the bones are much altered : the dorsum of the cuboid and fifth metatarsal bone sustains the weight of the body. The scaphoid and inner edge of the metatarsus look upward ; the inner malleolus almost touches the scaphoid, and the astragalus is pushed outward. Fibula lies in a line behind tibia ; tuberosity of os calcis looks upward ; in talipes *calcaneus* the heel is down and the front of the foot up. The tendons contracted in each case will be mentioned under the head of treatment. *Course.*—If left alone, patient learns to walk on deformed foot ; callosities form where there is friction or pressure ; the leg wastes ; the foot and leg thus get the peculiar clubbed appearance. *Treatment.*—Mild cases do not require tenotomy ; employ friction, and twist the foot for a quarter of an hour three times a day into its natural position, pulling and fixing foot in position with strapping ; strapping combined with splints ; Barwell's elastic bands ; shoes, etc., for talipes. The above contrivances used after tenotomy. *Tenotomy.*—For equinus, divide tendo Achillis ; for equino-varus, tendo Achillis after tibialis posticus and anticus (sometimes also plantar fascia, and some plantar muscles). Valgus and calcaneus seldom require tenotomy (see FLAT-FOOT.) Tenotomy-knives, blunt-pointed and sharp-pointed ; pads of lint ; hot-water can and strapping ; bandage ; splint. Tendo Achillis.—Position, on face. Assistant makes tendon tense ; pass a sharp-pointed knife beneath tendon, one inch from insertion ; place left forefinger over it ; cut gently with sawing motion toward skin ; assistant should relax when he feels that the tendon has gone ; withdraw knife and instantly place finger over wound ; then put on pad instead of finger, strap, bandage and splint. Tibialis posticus.—One inch above inner malleolus. Inner edge of tibia. In fat infants, midway between anterior and posterior borders of leg. Insert sharp tenotome half an inch, so as to open deep fascia. Substitute blunt tenotome ; pass this with one surface toward tibia, and other toward tendon. Assistant meanwhile holds foot inverted. Now foot is inverted, at same time edge of tenotome is turned to tendon. If blanching of foot and much bleeding show wound of post-tibial artery, merely pad and evenly bandage and confidently expect good result. But postpone instrument treatment for a fortnight. Tibialis anticus.—Merely extend foot, insert tenotome, and divide tendon from behind forward. Peronei.—Sometimes divided for valgus. Divide behind external malleoli or a little higher ; adduct foot. *After-treatment.*—Three or four days after tenotomy, commence to extend by strapping, splints, Scarpa's shoe, elastic bands, or some other mechanical con-

trivance, according to gravity of case. In infants, extension should be effected in a month. In adults, three or four months may be occupied. At first the instrument should be shaped to fit the deformity; never force a foot into an ill-fitting instrument; attend daily to the case; beware of pressure-sores; plaster-of-Paris bandages may be used instead of movable apparatus. *Process of Healing in a Divided Tendon.*—The divided ends of the tendon retract, and the neighboring cellular tissue presses in between them, filling the interspace. In this cellular tissue corpuscles and lymph (inflammatory new formation) are poured out, which organize into fibrous tissue, uniting and exactly resembling in structure the divided tendon. The process resembles that by which the external callus unites a fractured bone. The advantage of tenotomy is that this new uniting medium is so much more extensible than the original tendon. Many surgeons now put up the foot in plaster-of-Paris as soon as the tendons have been divided; and Ogston treats even severe cases of club-foot with plaster-of-Paris, and without previous tenotomy.

Coccydynia.—A painful affection of coccyx; female sex; generally follows an injury—this injury may be received in parturition; comes on when coccygeal muscles are put in action, as by sneezing, coughing, walking, defecation, etc. *Treatment.*—If obstinate, divide all muscular and ligamentous structures from borders and tip of coccyx.

Collapse.—See SHOCK.

Colotomy.—*When Required.*—In obstruction to the large intestine, as from stricture of rectum (malignant or otherwise), or imperforate anus; in diseases of rectum or colon, *e.g.*, ulceration, or recto-vesical fistula, where it is desirable to prevent the irritation of fæces in the diseased parts. Three operations, viz.: 1, Amussat's in right lumbar region; 2, Amussat's in left lumbar region; Littré's in left groin. The left lumbar operation is sometimes named after Callisen, who merely attempted, but never effected, an operation. *Amussat's in Left Lumbar Region.*—Scalpel, forceps, retractors, director, handled needles, etc.; incision midway between last rib and crest of ilium, transverse or oblique, *i.e.*, parallel to nerves; extent, 5 inches; centre half an inch posterior to middle point of crest of ilium (Allingham); outer edge of quadratus lumborum thus exposed; now divide, from quadratus outward, on a director, the muscles to the extent of the skin wound (latissimus dorsi, obliquus externus and internus, and transversalis); secure vessels; distinguish, if possible, transversalis fascia from peritoneum; divide fascia; find colon; pass two ligatures through skin at both edges of wound, piercing colon on their way; make opening in bowel big enough to admit forefinger; pull out hoops of ligatures and divide them, thus making four ligatures; tie each. Oil margins of wound and place patient in bed. Occasional difficulty in finding bowel, especially when there is not complete obstruction and it is nearly empty. Use of distending injection before operation. Bowel must not be

sought for too far out from spine ; always lies in front of or below kidney. Roll patient on his left side, keeping finger in wound, bowel will sometimes then fall upon finger ; not much danger of wounding peritoneum if bowel be distended. Much danger of wounding peritoneum in infants, because descending mesocolon often exists. Operation in right lumbar region done in a similar manner. *After-treatment*.—Sedatives at first ; dress with oakum ; protect edges of wound with zinc ointment ; india-rubber bag and soft bandage afterward ; give good diet early ; if opening contracts, use sponge-tents ; lower part of intestine should, after convalescence, be occasionally washed out with warm water. *Prognosis*.—According to Cæsar Hawkins two-thirds recovered. But many more cases have since been recorded, and the fatal cases appear to die not so much from operation as from original disease ; therefore operation should be done in time.

Compression } of Brain.—*Vide* HEAD, INJURIES OF.
Concussion }

Condylomata.—*Causes*.—Mostly syphilis, gonorrhœa, and dirt. *Pathology*.—Papilliform, but sarcomatous or made of soft connective tissue in structure ; non-recurrent ; infectious. *Seat*.—About anus, foreskin, prepuce, and mucous membrane of mouth. *Treatment*.—Touch with argent. nit. ; zinc oxide, calomel, copper sulphate ; cleanliness, dryness ; wear prepuce back.

Contusion.—*See* BRUISE.

Corns.—*Causes*.—Intermittent pressure, or friction from tight or over-loose boots. *Pathology*.—At first a thickening of cuticle, then a bursa forms beneath ; afterward cuticle may grow thin while fibrous structures beneath hypertrophy and form base of corn, or the pressure of the thickened cuticle may cause absorption of the parts beneath ; tendency to inflame and suppurate. Resulting lameness may lead to secondary effects. *Treatment*.—Remove cause. Proper boots. Acetic acid, nitrate of silver, alkaline solutions, soap, water-dressing, etc., to soften cuticle ; knife to remove it. Open suppurating corns. Soft corns (*i.e.*, those which form beneath the toes) may be also cured by cotton wool between the toes, dusting with zinc oxide or with French chalk, and by above remedies also. Boots should be broad in sole, and straight along inner border. Belladonna plaster.

Coxalgia.—A term for hip-disease.

Cut Throat.—Usually suicidal. *Position*.—Generally opposite larynx, which it of course opens, unless the wound be superficial. *Dangers*.—(A, immediate) 1, hemorrhage ; 2, suffocation by blood-clot ; 3, suffocation by a displaced solid structure ; 4, entrance of air into a divided vein. (B, secondary) 1, exhaustion ; 2, erysipelas ; 3, abscess ; 4, some form of blood-poisoning ; 5, bronchitis or pneumonia ; 6, secondary hemorrhage, especially such as might be provoked by the patient tearing the wound open afresh. (C, remote) 1, cicatricial stenosis ; 2, fistula. *Prognosis*.—

When a large vessel is wounded, death is usually almost immediate. In other cases the prognosis would be hopeful, but for the unfavorable state of body and mind usually coexisting in suicides. *Treatment*.—1, Arrest hemorrhage; tie bleeding vessels; 2, extract clots from air-passages; 3, if the injured parts cannot be brought into apposition without sutures, and if these sutures will not interfere at all with drainage, use them. In most cases sutures are not necessary; place a bandage round the head and another round the chest, and connect these in such a manner as to hold the chin down toward the chest; 4, in cases where the injury is such as to seriously obstruct breathing through larynx, perform tracheotomy; 5, dress the wound with a mass of antiseptic gauze (of course, this is not meant to keep the wound aseptic); 6, the patient must be diligently fed, and if, from wound of the œsophagus or damage to the larynx, swallowing is impossible or difficult, a tube must be passed down the gullet and food passed through it. Be sure not to pass this tube into the trachea by mistake, a blunder easily made; 7, see that the nursing is diligent, energetic, and vigilant.

Cysts.—See TUMORS.

Deformities are of many different kinds, and are described elsewhere. *Vide* articles PALATE, CLEFT; CLUB-FOOT; CICATRICES, CONTRACTION OF; JOINT DISEASES; PARALYSIS, CONGENITAL; SPINE, CURVATURE OF, etc.

Delirium Tremens, though usually arising directly from prolonged and excessive drinking, is not unfrequently produced by a wound or compound fracture acting as an exciting cause in patients who have not lately been guilty of great excess. Accessory causes are abstinence from food, and any other depressing influence. *Pathology*.—"The striking appearance," *post-mortem*, "is that of excessive serosity" in the ventricles of the brain and between its membranes. *Symptoms*.—Tremor, especially observable in the hands and tongue. Wandering of the mind, usually limited to delusions about certain things; *e.g.*, the patient, while knowing perfectly well where and with whom he is, yet fancies there is a demon or some noxious animal in the corner of the room, or following him about from place to place. His mind is ever recurring to these fancies, and he frequently talks about them and insists upon taking measures to escape from his imaginary enemies: his delirium is a fussy, "busy" one. He is always in a state of dread, and is often inclined to suspect his friends of harboring designs against him. In his active anxiety to escape from these, he may do himself or even bystanders some injury. Hands unsteady. Tongue not only tremulous, but coated, usually with a creamy fur. Bowels confined. Breath foul, frequently alcoholic. No appetite. Sleeplessness, which has usually existed as a premonitory symptom before the delirium sets in. *Diagnosis*.—From (1) acute mania, (2) meningitis, (3) delirium of fevers. Note the coolness and moisture of the skin, absence of fever and, very likely, of pain in head. In the continued fevers, prostration has prob-

ably preceded the delirium, but thermometric observations and a consideration of the history (which is, unfortunately, not always easy to get) should settle the diagnosis. There is something very characteristic about the *manner* of the delirium in Delirium Tremens. *Prognosis*.—If sleep can be quickly procured, good. If not, and especially if the tongue gets dry and brown, bad. *Treatment*.—Indications (1) to procure sleep, (2) to keep up the strength. Watchful, firm and gentle, good-natured nursing. Milk, strong beef-tea, and small quantities of nutritious solid food, if it can be borne, at frequent intervals. Stimulants should either be forbidden altogether, or else allowed only in small quantities at a time, and then only on condition that food be taken with each draught. Beer is the best stimulant in these cases. A dose of calomel (5–10 grains) justifiable at first. Morphine subcutaneously. Hydrate of chloral (30 grains) repeated in two hours, and then in another three hours. Digitalis in large doses has been recommended. Mr. Holmes's remarks on treatment of Delirium Tremens in his *Treatise* are very clear and instructive.

Diabetes, Traumatic, has followed injury to the brain, and then sometimes passed off as the cerebral injury was recovered from.

Diphtheria is said to attack wounds when a layer of whitish false membrane forms on them and is at the same time accompanied by sloughing. See HOSPITAL GANGRENE.

Dislocation.—Three kinds: 1, traumatic; 2, congenital; 3, spontaneous. In traumatic, the capsule is almost always ruptured. **COMPLICATED DISLOCATIONS**.—In these there is either fracture, or wound of skin, or of large vessel, or of nerve, or several of these misfortunes.

Causes of dislocations.—1. External force, which is (a) direct or (b) indirect. 2. Muscular action (*e.g.*, usual in dislocation of lower jaw). *Symptoms*.—1. Altered form of joint. Compare two sides of body. 2. Line of direction of misplaced bone does not pass through the articular surface of the other bone. 3. Lengthening or shortening of limb. 4. Altered position of limb to trunk, *e.g.*, projection of elbow from side. 5. Abnormal distance between certain prominent points of skeleton, *e.g.*, between internal condyle and olecranon. 6. Ecchymosis (rarely distinct at first, sometimes absent). 7. Pain. 8. Inability to move the limb. Manual examination must finally settle the question in most cases, showing the articular cavity empty and the head of the bone at some other point. Anæsthesia may be necessary for a diagnosis, because of soft parts being so swollen and tender. A soft crepitation sometimes caused by rubbing head of bone on torn capsular ligaments and tendons, partly from the compression of firm coagula. *Diagnosis*.—1, From dislocated articular fracture. Easily made by an attempt at reduction. The latter is readily reduced, but returns at once; 2, from contusion and sprain. Examine carefully; 3, from relaxation of the capsule in paralyzed limbs. Here consider the history, and make a careful local examination.

Capsular opening is of variable size. Escaped head of bone does not always remain immediately opposite it. Occasional spontaneous reduction by muscular action.

Mechanical Obstructions to Reduction.—1, Contraction of muscles. Head of bone may be caught between two contracted muscles; 2 (a far more frequent obstacle), a small capsular opening, or its occlusion by the entrance of the soft parts; 3, certain tensions of the capsular or strengthening ligaments. *Reduction.*—Easiest immediately after the injury. Later, anæsthesia often required. Manœuvres depend on joint affected. Usually, the assistants make the motions while the surgeon himself manipulates head of bone. Often everything depends on correct anatomical knowledge. Multiplying pulleys, Bloxam's dislocation tourniquet: these things now only used under anæsthesia; when they involve the application of straps round the chest, they make anæsthesia more dangerous. If too great violence is used—1, patient may collapse; 2, limb may mortify from the pressure; 3, great vessels or nerves may be ruptured; 4, rupture of other soft parts, as skin or muscle; 5, fracture of bone; 6, limb may be torn off. These accidents occur mostly in attempting to reduce old dislocations. The results of pressure best prevented by fastening the straps over a wet bandage previously applied from below upward. Nerves and muscles are most liable to rupture when adherent to deep cicatrices. Use of Malgaigne's dynamometer to measure force employed. *After-treatment.*—Reduce synovial inflammation, which always ensues, by moist bandages and cold compresses. Passive motion: in shoulder, not for a fortnight; in elbow and hip, earlier. Too early motion may cause:

HABITUAL DISLOCATION.—When a joint has been several times dislocated, it becomes extremely liable to dislocation. *Treatment.*—Long rest of the joint.

IRREDUCIBLE DISLOCATION.—Restore the movements as far as possible by passive and active exercise, otherwise the muscles atrophy. The anatomical changes are as follows: The extravasation is reabsorbed; the capsule folds together and atrophies; the soft parts about the misplaced head become infiltrated with plastic lymph, and transform to cicatricial, firm connective tissue, which partly ossifies; the cartilage metamorphoses into connective tissue, and adheres to the neighboring parts; the surrounding muscles suffer considerably from molecular disintegration and fatty metamorphosis. *How long Dislocations are Reducible.*—Depends on joint. Ball and socket much longer than hinge-joints. Shoulder may be reduced after years. Hip, even after two or three months, very difficult. Tenotomy has been employed, but not very successfully, for the chief obstacle is the firm adhesion of the head of the bone in its new position. Is reduction of such old dislocations desirable? Often preferable to let patient simply exercise limb well in its new position. Breaking up adhesions about the head of the bone by rotating it forcibly (*vide* ANÆSTHESIA) may facili-

tate this. Pressure on brachial plexus may require excision of head of humerus.

COMPLICATED DISLOCATIONS.—1. With fracture. Always attend to this, and apply an apparatus till it has united, changing it and putting the joint in a new position, say every ten days, to prevent stiffness. 2. With compound fracture. Resect joint, or try to save it, using some thoroughly antiseptic method. If there is considerable crushing and tearing of the soft parts, amputation may be required.

CONGENITAL DISLOCATIONS.—Distinguish from those caused during parturition. Occur in most of the joints of the extremity, but especially in the *hip*. Head of bone above and behind acetabulum. Generally readily replaced. Peculiar wabbling gait. If the dislocation is one-sided, patient, lying on his back, turns the foot inward. Acetabulum is too shallow, and, in adults, filled with fat. Ligamentum teres, if it exists, is abnormally long. Head of femur too small. Articular cartilage usually completely formed. Capsule very large and relaxed. Cure mostly impossible. *Causes*.—Perhaps excessive quantity of fluid in joint, at very early period of uterine life. Perhaps also extreme abduction in uterine life. *Result*.—In course of time, spinal curvature. *Treatment*.—It has been recommended that the thigh should be kept for a very long time in a position of abduction (see *Medical Record*, 1880).

DISLOCATION OF ANKLE.—Four directions; outward, inward, backward, forward. 1. *Outward*.—Accompanied by fracture of fibula above outer malleolus and rupture of deltoid ligament or fracture of inner malleolus. Same thing as "Pott's Fracture." Foot turned outward. Depression over fracture of fibula. *Treatment*.—Dupuytren's splint (to inner side), or ordinary leg-splints. Keep foot well in, and sole at right angles to leg. 2. *Inward*.—Accompanied by fracture of inner malleolus. *Treat* on same principle as Pott's Fracture, only keeping foot well out. 3 and 4. Dislocations backward and forward may be distinguished from fracture of leg-bones by relation of malleoli to tarsal bones. After reduction, apply starched bandages and mill-board, or some other firm apparatus.

COMPOUND DISLOCATION OF ANKLE-JOINT.—Requires amputation if tibial arteries be injured, or other important parts be much damaged. Otherwise, remove small fragments, clean, set and dress. Primary excision of the joint occasionally advisable. Ankylosis pretty certain. Use antiseptic dressing.

DISLOCATION OF ASTRAGALUS.—If simple, must be either backward or forward. Latter has an inclination either outward or inward. Dislocation directly outward or inward is always complicated with fracture of leg-bones. Dislocation *forward* most common. Complete or incomplete. Prominence of head of bone beneath skin in front of ankle. Malleolus of side toward which the bone is inclined projects. Danger of skin sloughing from pressure. *Treatment*.—Flex knee to relax gastrocnemii; extend

foot and push astragalus into its place. This is tolerably easy in partial dislocation. But complete dislocation may require anæsthesia and division of tendo Achillis. Dislocation backward is very rare and difficult to reduce. *Compound Dislocation*.—Except in the most favorable cases, reduction is not to be tried. The question lies between excision and amputation. Decide and treat on general principles. In *simple irreducible dislocation*, primary excision is not advisable. The bone may remain harmless in its new place.

DISLOCATIONS OF SEPARATE CARPAL BONES, especially of os magnum, can be reduced by pressure, and generally require, for some time, apparatus to prevent recurrence.

DISLOCATION OF CLAVICLE.—*At the Sternal End*.—Three varieties, viz.: 1, forward; 2, backward; 3, upward. Forward most common; others very rare. The deformity is in each case so manifest that diagnosis is palpable. In dislocation backward, end of clavicle presses on trachea, œsophagus, and great vessels of neck. *Treatment*.—Extend shoulders backward, and bandage to a splint applied to the back with a pad between splint and spine. Difficulty of keeping bone in its place. Truss to press on head of bone displaced forward. *At the Acromial End*.—Dislocation almost always upward, but sometimes below acromion, or even below coracoid process. Reduction easy by pulling shoulders backward. Here also difficult to keep bone in its place. Gutta-percha or leather shoulder-cap, with a pad over end of clavicle. Bandage in a line parallel to upper arm over shoulder and elbow. Then bandage arm to side.

DISLOCATION OF COCCYX may result from falls or during parturition. Reduce with the assistance of a finger in the rectum.

DISLOCATIONS OF THE ELBOW.—I. Complete dislocation of radius and ulna: 1, backward; 2, forward—in the former there may be fracture of the coronoid process, in the latter fracture of the olecranon; 3, inward; 4, outward. The latter two are rarely complete.

II. Ulna alone: backward only.

III. Radius alone: 1, forward; 2, backward; 3, outward; 4, partial forward.

IV. Ulna backward, with radius forward.

Injuries of elbow often obscured by great swelling. Following excellent directions, as to the points to be noticed in an injury to the elbow, are from Holmes (abbreviated): 1. Is there transverse fracture of humerus? 2. Longitudinal or partial fracture of lower end of humerus? *e.g.*, of condyle. 3. Distance between olecranon and internal condyle? 4. Fracture of olecranon? 5. Are motion and position of head of radius normal? 6. Do axes of radius and ulna correspond in direction?

Dislocation of *Both Bones Backward*.—Prominence of olecranon; distance between it and internal condyle increased. Prominence of lower end of humerus *below* fold of skin at front of elbow-joint. (In fracture of lower

end of humerus, the prominence of the upper fragment is above that fold.) Fracture of coronoid process causes increased mobility, as well as crepitus.

Dislocation of *both bones forward*.—Arm is lengthened, and olecranon, unless broken off, is on a level with condyles.

Dislocation of *ulna backward*.—Head of radius can be felt normal; but olecranon is too far back from internal condyle.

Dislocation of *radius forward* (most common of the three modes).—Elbow somewhat flexed, and midway between pronation and supination. Further flexion, as well as supination, very limited; head of radius can be felt displaced. After reduction, very liable to recur, because orbicular ligament is ruptured. Not uncommon in childhood.

Dislocation of *radius backward*.—Head of bone can be felt behind external condyle.

Dislocation *outward* recognized by manipulation.

Causes.—Falls upon elbow or hand. Half the cases occur in boys.

Reduction of Dislocations of Elbow.—Can often be effected by merely pressing the bones into position. Sometimes extension, and even anaesthesia, required. Dislocations two months old have been reduced, after breaking down adhesions by forcible flexion and extension. In dislocation of the radius, extend from the hand. Bending elbow across knee a useful method of reduction. *Compound Dislocations*.—Amputation seldom necessary.

DISLOCATION OF HEAD OF FIBULA.—Extremely rare.

DISLOCATIONS OF FINGERS.—Are not common, and may be reduced by extension. Amputation should never be done for compound dislocation, unless the finger be hopelessly crushed.

DISLOCATION OF HIP.—Four chief directions: 1, backward and upward on dorsum ilii; 2, backward into sciatic notch; 3, downward into obturator foramen; 4, inward on pubes. Other varieties, *e.g.*, into perineum, are very rare. First form is most frequent. *Causes*.—The backward dislocations take place when a person is in a stooping position, and either falls heavily on his feet, or is struck by a heavy weight falling on his back. Dislocation into the thyroid foramen is caused by sudden and violent abduction, and dislocation on the pubes by sudden and violent extension of the limb, especially if coincident with a blow on the back of the thigh.

Anatomy.—The anterior part of the capsule, including Y-ligament of Bigelow, remains wholly or partially unruptured in all ordinary dislocations, and thus limits the position of the bone, interferes with reduction by extension, and can be utilized in reduction by manipulation. The obturator internus is a strong tendinous muscle; and backward dislocations are on the dorsum ilii, or toward the sciatic notch, according as they escape from the acetabulum above or below that muscle respectively. In the lower dislocation, the head of the bone is superficial to the obturator in-

ternus. Fracture of the acetabulum not uncommon, especially in dorsal dislocation.

Symptoms.—1. Dislocation on dorsum ilii. Hip looks widened. Peculiar position of limb; rotation inward: slight flexion of both hip and knee; axis of thigh intersects lower third of sound thigh; ball of great toe rests on instep or ankle of other foot; heel raised. Abduction and external rotation impossible; stiffness and immobility under chloroform; head of bone makes a prominence in its new position; trochanter is above a line between ant. sup. spine of ilium and tuberosity of ischium (Nélaton's line). Shortening, one, two, even three inches. 2. Dislocation in sciatic notch.—Symptoms like those of dorsum ilii dislocation, only less marked. Axis of thigh across opposite knee; ball of toe on ball of other great toe. Shortening, half to one inch. 3. Dislocation into thyroid foramen.—Body bends forward; foot points slightly outward; a hollowness takes the place of the trochanter. Lengthening, two inches. Head of femur perhaps discoverable in its new position. 4. Dislocation on pubes.—In this and the other rarer forms of upward dislocation, head of bone can be felt in its high position; flattening of hip; abduction and eversion. Shortening one inch.

Diagnosis.—Of dislocation on dorsum ilii from impacted fracture of neck of femur with inversion. Under anæsthetics, the former shows immobility, the latter mobility. In the former the trochanter is behind, in the latter it tends to lie below the ant. sup. spine of ilium.

Reduction.—Each kind of hip-dislocation can be reduced in two ways, viz., extension and manipulation. Extension method is partly based on the idea that muscular contraction is the chief difficulty. But it is not so. The main resistance proceeds from strong ligaments, and sometimes from too small a hole in the capsule. Hence the advantage of manipulation. Dislocation on dorsum ilii.—1. Extension. Apply pulleys just above condyles of femur, and extend knee across lower third of opposite thigh; fix pelvis with perineal band. 2. Manipulation.—Place patient on back, and give anæsthetic completely; grasp knee and foot; flex well both knee and hip, adduct thigh, rotate outward, and suddenly bring down the limb into a straight line with body. If this fail, try again and again, or rotate inward instead of outward. Dislocation toward sciatic notch.—1. Extension. Place patient on sound side; apply perineal band and pulleys; flex limb, and draw it across opposite thigh.—2. Manipulation. Same proceedings as in dislocation on dorsum ilii. Dislocation into thyroid foramen.—1. Extension. A pelvic band pulls pelvis toward sound side. A perineal band, working beneath it, is connected with pulleys which extend upward and outward from the injured hip. The surgeon grasps the ankle of the dislocated limb, and, dragging inward, thus pries the femur into the acetabulum. Instead of the pelvic and perineal bands, the bed-post may be placed in the patient's fork, and used as a fulcrum. 2. Manipulation. Flex hip, abduct slightly, rotate strongly inward, adduct and straighten.

Dislocation on pubes.—1. Extension. Extend limb, well abducted, downward and backward; at same time pull head of bone outward by a towel round thigh just beneath groin. 2. Manipulation. Pull strongly on thigh in line of axis of femur, at same time bending it on the abdomen; rotate inward, and bring down into a line with body; or employ same manoeuvres as in thyroid dislocation.

Old Dislocations.—Reduction is tolerably safe to attempt up to two months. Afterward, danger of inflammation of joint or fracture of femur.

Dislocation with Fracture of Femur.—Try to push head of bone into place, or let bone unite, and then, in sixth week, attempt reduction.

DISLOCATION OF LOWER JAW.—Usually bilateral. *Causes.*—Direct violence, or over-extension in gaping. *Symptoms.*—Bilateral: mouth widely open and cannot be shut; saliva dribbles; speech and deglutition almost impossible; depressions where condyles ought to be; prominences behind and beneath malar bones. Unilateral: symptoms less marked; chin inclines toward sound side; depression in front of ear only on side dislocated. *Mechanism.*—Two views. One, that it is caused by the coronoid process locking against the malar bone; the second merely attributes it to excessive muscular action.—*Prognosis.*—If left unreduced, a certain amount of motion returns, and the teeth can be made to nearly, if not quite, meet. *Reduction.*—Firstly, disengage condyle by pressing downward with thumbs, guarded by a towel, in mouth behind last molar teeth. Secondly, push chin backward and upward. *Congenital dislocation* is generally accompanied by other signs of imperfect development. *Subluxation* is a kind of “catching” of the jaw, which the patient can easily remedy for himself. It occurs in young people of relaxed fibre. *General Treatment.*—Tonics and time.

DISLOCATION OF KNEE.—Five kinds: forward, backward, inward, outward, and dislocation of semilunar cartilage, called “subluxation.” The first four are unmistakable, from the obvious deformity. The lateral dislocations are most common and not complete. One or other condyle slips over to the opposite half of the tibial surface. Dislocation of the tibia forward is dangerous from pressure on popliteal vessels by femur. Subluxation is marked by sudden and severe pain attacking joint, which then remains semiflexed. *Reduction.*—Extend and rotate slightly. Compound dislocation, except in favorable cases, requires amputation. Subluxation is reduced by flexion, followed when the patient is off his guard by sudden extension, combined with slight rotation. While manipulating, press firmly with one thumb on any tender spot.

DISLOCATION OF METACARPAL BONES.—Rare, obvious, and easily reduced by extension.

DISLOCATION OF METATARSUS, if compound, may require amputation.

DISLOCATION OF PATELLA.—Four kinds: outward (most common), inward, edgewise, and upward. *Causes.*—A blow on the edge of the pa-

tella, or sudden muscular action. *Signs, etc.*—1, Outward (most common); patella rests on outer side of external condyle, generally with outer edge raised. 2, Inward: most rare, almost unknown. 3, Edgewise: either inner or outer edge of patella is twisted into intercondyloid space, the bone standing on its edge. 4, Upward: ligamentum patellæ is always ruptured; quadriceps extensor pulls patella upward. *Reduction.*—In first two varieties flex thigh on abdomen; press outer or inner edge of patella, according as dislocation is outward or inward. The other edge is thus raised and the bone freed, the quadriceps at once pulling it into position. Case 3 often presents great difficulties. Anæsthesia. Manipulation. Manipulation combined with bending leg and rotating it on axis of tibia. Forceful flexion. Sudden and violent extension made by patient himself. The cause of the difficulty said to be wedging of the superior angle of the bone in the intercondyloid space. Shun any division of tendons or ligaments. If dislocation be irreducible, wait, watch, and act according to the course taken by nature. 4, Upward dislocation: treat like fractured patella.

DISLOCATION OF LOWER ANGLE OF SCAPULA.—Query as to pathology. Slipping of latissimus dorsi or paralysis of serratus magnus. On latter supposition use strychnine endermically (Erichsen); electricity; orthopedic appliances.

DISLOCATION OF SHOULDER-JOINT.—Five kinds: 1, downward, sub-coracoid; 2, downward, subglenoid; 3, inward, sub-clavicular; 4, backward, sub-spinous; 5, upward. Sub-coracoid is far the most common, sub-spinous very rare. *Causes.*—Predisposing: the natural shallowness and free movement of the joint, previous dislocation, male sex, old age. Exciting: falls on shoulder, elbow, or hand; muscular action. To produce the dislocation backward, the elbow has to be directed across chest when falling, or else twisted inward. *Signs.*—Six common signs (Erichsen): 1, flattening of shoulder; 2, hollow under acromion; 3, apparent projection of this process, with tension of the deltoid; 4, presence of head of bone in an abnormal situation; 5, rigidity; 6, pain in shoulder. These resolve themselves into three simply: 1, head of bone is evidently absent from its place beneath acromion; 2, it is present elsewhere; 3, there are such signs as are common to dislocation of all joints, viz., stiffness, pain, etc.

1. *Sub-coracoid.*—Head of bone under or slightly internal to coracoid process. To feel it, raise the elbow. Elbow projects from side. Slight lengthening, real or apparent, of upper arm; rarely slight shortening. Stiffness; movement only possible antero-posteriorly.

2. *Sub-glenoid.*—Much like sub-coracoid, but head of bone more distinctly felt in axilla, elbow projects more, and there is lengthening, one inch. Marked symptoms of pressure on axillary vessels and nerves.

3. *Sub-clavicular.*—An extreme degree of “sub-coracoid.” Promi-

nence of head of bone beneath clavicle. Elbow projects backward and outward.

4. *Sub-spinous*.—Head of bone felt beneath spine of scapula. Elbow outward and forward.

5. *Upward*.—Always complicated with fracture of acromion or coracoid. Consequently, injury and swelling likely to be severe. Shortening. Crepitus and deformity.

Anatomy.—In the first three forms the inner and lower part of the capsule is torn, and, if the displacement be great, either the great tuberosity of the humerus, or else some of the muscles attached to it (supra- and infra-spinatus and teres minor) have to give way. In sub-glenoid, the sub-scapularis also goes. In sub-spinous, also, the sub-scapularis is torn. In sub-spinous, head of bone lies between sub-scapularis and teres minor; in sub-glenoid, between sub-scapularis and long head of triceps; in sub-clavicular, on second and third ribs.

Diagnosis.—1. From fracture of neck of humerus. This fracture is never caused by anything but direct violence. Then there are the general differences between fracture and dislocation. Both injuries may occur together. 2. From mere paralysis of deltoid. Then, although there is flattening, still head of bone is easily felt in glenoid cavity.

Reduction.—By heel in axilla; by manipulation; by pulleys; by knee in axilla; by air-pad in axilla; by extension upward. *Heel in Axilla*.—Patient lies on back. Surgeon sits with unbooted heel in injured axilla. Extension made either by himself, or by assistants or pulleys. Anæsthesia. Slight rotation of limb facilitates. Neither anæsthesia nor assistants necessary in most cases. *Manipulation*.—Bring arm with a sweep round in front of chest and face, then rotate inward whilst bringing the arm down to the side again. This should be done by one hand of the surgeon, while with the other he tries to press the head of the humerus into its place. Anæsthesia helps. *Pulleys*.—Anæsthesia. Caution: danger of rupturing nerves, axillary artery, etc. Forearm has been torn off. First apply a wet bandage to the arm, then put on a clove-hitch over the bandage, above the elbow. Extension should be slow and patient. Counter-extension by a jack-towel, or by surgeon's heel or knee. *Knee in Axilla*.—Patient sits on a chair. Surgeon places one foot on chair and the knee in axilla. He then seizes the arm, extends a short time, and, lastly, steadying the shoulder with left hand, uses the knee as a fulcrum on which to lift humerus into its place. Or, as recommended by Flower in Holmes's system, the surgeon can place his back against a door-post and have extension made through the doorway by assistants, while he steadies the shoulder with both hands. Mr. Cock placed an air-pad in the axilla and bound the elbow firmly to the side. In three days the dislocation was found to be reduced. All other attempts had previously failed. *Extension upward* can also be made with the heel against the shoulder; or *extension outward*

with counter-extension from opposite wrist. Skey has shown that, owing to the great mobility of the scapula, the real direction of the extending force is much the same, whatever it may be apparently.

COMPOUND DISLOCATION OF SHOULDER.—Rarity. Question of resection uncertain. Antiseptic treatment. *Complications*.—1, With fracture of neck of humerus attempt reduction by manipulation, then treat fracture. If reduction impossible, put up fracture, and in sixth week (when union has taken place) again attempt reduction. If *rupture of axillary artery* occur, reduce dislocation first, and then tie both ends.

DISLOCATION OF THUMB (METACARPO-PHALANGEAL JOINT).—Almost always backward. *Signs*.—Thumb is bent back. Head of metacarpal can be felt projecting on palmar aspect, and base of first phalanx on dorsal aspect. Main obstacle to reduction is engagement of neck of metacarpal between two heads of flexor brevis pollicis, as in a button-hole. *Reduction*.—The efforts are directed to disengage from flexor brevis pollicis; bend the metacarpal joint of the thumb well into palm of the hand, thus relaxing the muscle; now press the first phalanx of the thumb well backward, *i.e.*, hyperextend it; at the same time pull the thumb downward, *i.e.*, toward the tips of the fingers; lastly, flex the thumb (every joint) into the palm: if this fails, the pulleys may be tried. Anæsthesia; subcutaneous division of one or both heads of flexor brevis, or lateral ligaments; passing a blunt hook through a small incision and hooking tendons of flexor brevis over head of metacarpal bone. After reduction, keep thumb bent toward palm for a day or two.

DISLOCATION OF WRIST.—Extremely rare; readily reduced. *Diagnosis*.—From Colles's fracture; in fracture the styloid processes go with the hand; in dislocation, they approach too near the finger-clefts.

Dissection Wounds.—Under this head we notice the lymphatic and cellular inflammations and blood-poisoning produced by absorption of animal poison from dead bodies. Bodies lately dead much more dangerous than those which have been long dead; bodies dead from erysipelas, peritonitis, puerperal and typhoid fevers especially dangerous. Peritoneal fluid particularly poisonous after death from peritonitis. Not necessary that there should be a skin wound. Poison absorbable through hair-follicles or through unbroken skin. *Signs and Prognosis*.—Three grades of severity: in the first the symptoms, except slight fever for a few days, are trivial and almost confined to the limb poisoned; in the second, there is either severe cellulitis in the limb, or abscesses form in parts of the body beyond the limb, or both these troubles may be present. This grade is liable to pass into chronic pyæmia. The third grade is marked by violent and sudden symptoms of septicæmia, and often terminates fatally in two or three days. The point of inoculation usually looks angry and purulent, and presents either a vesicle, a pustule, or a scab; it is painful; the lymphatics extending from it to the nearest glands are reddened, tender, and

sometimes surrounded by inflamed and even suppurating cellular tissue (phlegmonous erysipelas); these glands are tender and enlarged, and abscesses tend to form around them. Chills, rise of temperature, and other feverish symptoms come on within twenty-four hours. Symptoms such as these are common to almost every case, but the further course is variable. In the third grade of cases, within forty-eight hours, to quote Mr. Callender, "the patient, flushed, anxious, restless, even delirious, is in a hopeless condition, with prostration and rapid sinking." In the second grade, there may be extensive cellulitis or the formation of numerous abscesses near glands; but so long as the disease is subacute or chronic, and provided actual pyæmia does not occur, the prognosis is very hopeful. In these cases the spirits are usually very low. In the first grade, recovery takes place in a week or two, or even in a few days. *Treatment*.—If, while dissecting, the hand should be wounded, grasp it so as to check the return of venous blood, wash it, suck the wound, permit it to bleed freely, and let a stream of cold water flow over it. If afterward signs of local poisoning appear, give the limb complete rest, and the patient a country holiday, with instructions to avoid any kind of exertion, for excitement of the circulation appears to drive poison from the wound inward. Cauterize the wound; a warm bath for the limb; generous diet; fresh air; tonics; purgatives; rest in bed for the severe cases; to properly rest a limb, splints are necessary; mill-board and starch apparatus; poultices. Open abscesses as they form.

Drowning.—See article ASPHYXIA.

Dura Mater, Fungus of.—A tumor springing from the dura mater, and pressing outward through the cranium; simple and malignant forms; the thin skull may be felt crackling over the tumor after it has pressed its way through, and the tumor pulsates with the respiratory movements like the brain. Before tumor appears externally, there are usually signs of intracranial pressure, *e.g.*, diplopia or even convulsions. *Prognosis*.—Eventually fatal, without treatment; very unpromising with. *Treatment*.—Moderate compression gave relief in some cases. In suitable cases expose tumor by a crucial incision; enlarge opening in skull, if necessary, with trephine, and remove tumor from dura mater, if possible. It is next to impossible to diagnose, before operating, whether similar tumors spring from the dura mater or from the cranium itself. Refer to Louis on Fungus Tumors of Dura Mater, "Sydenham Society's Translation."

DURA MATER, IRRITATION OF.—Injuries of the head which cause this produce symptoms such as contractures and convulsions on the *same* side of the body.—See Duret on "Cerebral Traumatism," and an abstract by Ferrier, in *Brain* for 1879. A very severe case of this affection recovered under cold douche.—See "Transactions Clinical Society," 1879, p. 145.

Dysphagia is a symptom arising from obstruction to the œsophagus, *e.g.*, by pressure from aneurism, tumors, etc., or from ulcers, cancers, or foreign bodies; sometimes merely spasmodic. *Vide* ŒSOPHAGUS.

Eczema.—A superficial inflammation of the skin, with a tendency to spread, and attended by the formation of minute vesicles, from which escapes a discharge, usually serous. Three varieties: 1, eczema simplex, or ordinary eczema; 2, eczema impetiginodes, where the secretion is purulent; 3, eczema rubrum, where there is great redness and inflammation. Eczema squamosum is a term applied when the transudation dries quickly.

Causes.—Three classes: 1, direct irritants, *e.g.*, solar and tropical heat, the water cure, mercurial inunction, irritation of parasites; 2, venous obstruction, *e.g.*, varicose veins in legs; 3, constitutional causes; sometimes congenital; occasional connection with dyspepsia and disordered menstruation. Scrofulous and rickety children are much disposed to eczema. Gout.

Symptoms and Course.—Skin red and moist, the moisture exuding from minute vesicles. Or, instead of moisture, a branny dryness. Itching.

Tendency to become chronic and to recur. *Prognosis.*—As a rule, quite amenable to treatment. *Treatment.*—Ung. hydrarg. ammoniat.; lotion of hydrarg. perchlor. (gr. ij. ad $\bar{\text{z}}$ j.); ung. zinci. Scabs to be removed by fomenting and poulticing, or by soaking in oil; lotions of carbonate of soda to check discharge. For very extensive eczema with great itching, use the shower-bath two or three times a day for ten or fifteen minutes in a warm room. For old cases with thickening of the skin, soft-soap, tar, and caustic potash may be used; rub the soft-soap in twice a day with flannel, for three days, then stop, leaving the soap on for three more days, then remove the soap by a bath. A few days after this, commence a similar course again, and repeat till a thorough cure is effected. When the eruption is dry and scaly, use tar ointment. Danger of tar-poisoning (known by diarrhoea, vomiting, tarry odor of urine and vomit). When soft-soap and tar are well borne, but do not cure, apply caustic potash ($\bar{\text{z}}$ j. aquæ $\bar{\text{z}}$ ij.) once a week; immediately afterward apply cold wet compresses to relieve the violent pain. Constitutional treatment often advisable. Laxatives, arsenic, Donovan's solution, iodide of potassium in increasing doses. Vigorous local treatment should not be employed in moist eczema of the face or scalp of children, or when the eczema appears to be vicarious for other diseases. The probable cause should never be neglected. In eczema of the legs from varicose veins, prescribe horizontal rest in middle of day, and support from rubber bandages or elastic stockings. Always superintend the use of these bandages at first.

Elephantiasis Arabum.—Causes unknown. Occurs in hot countries, especially West Indies and South America; rare in Europe. *Symptoms.*—Great hypertrophy of skin and subcutaneous areolar tissue of some part of the body. Parts usually affected are lower extremities, scrotum, labia, and face. *Pathology.*—It appears to depend on obstruction of the lymphatics and lymphatic glands. The arteries of the part are usually much enlarged. *Treatment.*—Ligature of the main artery of the limb has cured some cases, but failed in others.

ELEPHANTIASIS OF SCROTUM.—*Vide* SCROTUM, DISEASES OF.

Embolism.—Signifies the conveyance of some solid body, small or large, by the current in a blood-vessel, till it stops and obstructs some vessel; this obstructed vessel may be an artery, or a vein, or a capillary, and it may be in the systemic or the pulmonic circulation. The obstructing body is called an *embolus*, and is usually a piece of fibrin washed from one of the cardiac valves, or from the clot in an aneurism, or from an inflamed vein. Where the embolus rests an abscess is apt to form. In regions where the collateral circulation is poor, *e.g.*, in the brain, death of the parts whose blood-supply is obstructed by the embolus may occur. When emboli are of a septic nature, they produce pyæmic abscesses. Entozoa have been known to constitute the emboli.

Emphysema.—In surgery, means only the passage of air into the cellular tissue. *Causes.*—Mostly wounds of lung, especially by broken ribs. Very rarely decomposition and consequent production of gas in a wound. The air almost always passes first into the pleural cavity, and is pumped thence by respiratory movements into cellular tissue. *Symptoms and Course.*—The peculiar crackling feeling is unmistakable and pathognomonic. Unless the air continues to pass into the cellular tissue, it is soon entirely absorbed. The emphysema is first noticed near the wound, and spreads thence often to great distances. The rupture of an air-cell in the lung may cause emphysema of the mediastina and the neck. *Treatment.*—Treat the cause; put a pad over the wound.

Empyema.—Fluid, at first serum or blood, effused in the pleural cavity, may become purulent. The condition thus produced is called an empyema, and is described more fully in medical than in surgical works. But I must call attention to the treatment by excision of part of a rib.—(Peitavy: *Medical Record*, Aug., 1876; W. Thomas: *Birmingham Medical Review*.)

Enchondroma.—*See* TUMORS.

Epistaxis.—Bleeding from the nose. *Causes.*—Congestion of mucous membrane of nose; this may result from catarrh, from a varicose condition of the nasal veins, the result of old catarrh, from congestion of the liver, from heart disease, and even from dyspepsia. Childhood and puberty are the usual ages, but middle life (from liver, heart, or kidney disease, etc.) is also subject. Epistaxis in old age sometimes appears to result from weakness, which it of course aggravates. Blows; hemorrhagic diathesis; vicarious menstruation. *Prognosis.*—Dangerous in old and weakly people. *Treatment.*—Perfect rest, coolness, but extremities should be warm; bathing face with hot water to diminish congestion of mucous membrane; sometimes cold water acts better; raising hands above head; head not to be held down over a basin; injections of cold water, of hot water (temperature 100°), of tinct. ferri perchlor., pure or diluted; these injections may be given by a syringe which directs the current backward.

Ice to the back of the head; cold to the spine; dry cupping between shoulders; plugging; plugging posterior nares. *Operation*.—A piece of whip-cord is passed through the nose into the pharynx by means either of Bellocq's sound or of an elastic catheter. It is then pulled from the pharynx into the mouth by forceps, and a plug of compressed sponge or lint tied to that part of the string now hanging out of mouth, but some distance from its end. Plug should be small and nicely shaped, or part of it will irritate back of pharynx or even top of larynx. Now pull the string back through the nose and guide the plug into the posterior nares. Nasal and oral ends of string should be tied together and fixed on face with strapping. When removed, plug is to be pulled back through mouth; but string should not be taken away till danger of recurrence seems to be gone.

Epithelioma.—See CANCER.

Epulis.—A term applied to fibrous, sarcomatous, and cancerous tumors of the gums. Most are fibro-myeloid; the less of the myeloid structure, the more innocent the growth. *Symptoms*.—Non-cancerous epulis; a fleshy red tumor of the gum; teeth loosened and pushed forward; size variable; sometimes ulceration. Cancerous epulis has the special marks of malignancy, rapid growth, excavated ulcer, etc. *Prognosis*.—Neither fibrous nor myeloid epulis usually returns if the bone from which it springs be removed. *Treatment*.—Removal of tumor and attached alveoli with cutting pliers and small saw.

Erysipelas.—A diffuse inflammation of the skin or subcutaneous areolar tissue, or of both together, almost always attacking the neighborhood of some wound. Three kinds, viz.: 1, simple; 2, cellulocutaneous; 3, diffuse cellulitis. *Causes*.—Usually a wound which has been exposed to unhealthy influences, *e.g.*, septic virus, draughts of cold air, constant mechanical irritation, certain epidemic influences, contagion from an adjacent case of erysipelas or puerperal fever. Predisposing causes are bad ventilation, bad and insufficient food, dyspepsia, hospital air when impure, depressed nervous system, want of cleanliness, diabetes, kidney disease, alcoholism, contact of atmospheric germs with a wound. *Signs*.—1. SIMPLE ERYSIPELAS. At first, rigors, fever, sudden rise of temperature, sometimes to 104°, symptoms of disordered digestive organs, *e.g.*, furred tongue, constipation, or diarrhoea. In about twenty-four hours, sometimes later, a rosy redness appears on the tract of skin affected. Margins of redness either well- or ill-defined. It disappears on pressure. Slight superficial swelling; when the face or head are affected there is often considerable oedema, especially of eyelids. Progress of fever is irregular, and depends on whether rash spreads or not. Recovery usually takes place in mild cases in a few days, in more severe cases in a week or so, and is followed by desquamation. Often the adjacent lymphatic glands enlarge before the erysipelas appears. The rash may spread all over the body (erysipelas ambulans), or disappear in one place to reappear in another

(erysipelas erraticum). These varieties are more serious. When there is a wound, it ceases to secrete healthy pus for a time. Pain is rarely severe.

2. **CELLULO-CUTANEOUS ERYSIPELAS** (Phlegmonous erysipelas).—Constitutional symptoms are as in simple erysipelas, but more severe. Redness deeper. Swelling greater. Within a week the swelling becomes boggy, and next fluctuates, indicating suppuration. Throbbing pain and perhaps a slight subsidence of the symptoms may precede suppuration. Extensive sloughing usually occurs.

3. **DIFFUSE CELLULITIS** is always preceded by a wound, especially a dissecting-wound or the bite of some venomous animal. The skin is not much affected; but the subcutaneous cellular tissue presents the same oedema, swelling, hardness, bogginess, fluctuation, suppuration, and sloughing as are seen in phlegmonous erysipelas. The constitutional symptoms are severe and usually of an asthenic type. Danger of pyæmia.

Pathology.—All the above forms are related, and are primarily inflammations of the lymphatics (lymphangitis), erysipelas simplex affecting only the cutaneous absorbents. In the boggy stage of cellulitis and phlegmonous erysipelas, the cellular tissue is distended with effusion, and parts of it are approaching a state of mortification. Sloughing and suppuration almost always follow. Great thickening and stiffness are often left after the deeper varieties of erysipelas. *Diagnosis.*—Do not confound the redness and oedema over an abscess beneath deep fascia with erysipelas. Diagnose also from *phlebitis*. *Prognosis.*—Bad when the habits are intemperate, kidney or liver diseased, age old or very young, cause epidemic, form erratic or recurrent, duration prolonged, or if very severe and occurring in the head and face (or neck especially). *Treatment.*—Commence with purge (calomel gr. v.-x.), salines, tinct. ferri perchlor. (℥. xx. 4th horis). Diet nourishing, but light; avoid loading with more food than is digested. Stimulants recommended by most authorities. Moderate temperature, fresh air, but no draughts. Opium not well borne. Local treatment in simple erysipelas, cotton-wool, flour, zinc oxide, especially for erysipelas intertrigo, that is the form caused by two moist cutaneous surfaces rubbing against each other. Caustics, circumscribing rings of argent. nit. or tinct. iodine of very doubtful benefit. In the deeper varieties of erysipelas, fluctuating spots should be opened, and tense parts marked with small incisions (2 inches), before they fluctuate. Poultices. If incisions cause hemorrhage, stuff with dry or oiled lint. At commencement of erysipelas in strong, otherwise healthy persons, with foul tongues, give an emetic. This sometimes aborts the attack. Elevate position of part affected.

Excision of Joints.—The indications for excision and the conditions of success vary with each joint. Objects of excision may be : 1, to merely expedite recovery ; 2, to restore motion to an ankylosed joint ; or 3, one of the various purposes for which amputation is done. Hence the choice often lies between excision and amputation.

COMPARISON OF EXCISION AND AMPUTATION.—Life is always to be considered before limb. Excision involves a larger wound and greater strain on the constitution: hence it is bad for tuberculous and cachectic people. Much depends on the particular joint. Excision safer than amputation at shoulder and hip. Danger equal for the two operations at the elbow; at knee, excision is far more dangerous than amputation. At elbow and wrist excision is, of course, far preferable to amputation, because it leaves the hand. At knee, amputation is generally to be preferred, because of the great danger of excision. Excision of ankle is often a good operation; but, if the tarsal bones are diseased, there is great danger of recurrence, and removal of too much bone would leave too weak a foot. *Operation.*—Instruments: knives, forceps, lion-forceps, saws (Butcher's saw, key-hole saw, chain-saw, etc.), chisels, cutting-pliers, rasping instruments for scraping off periosteum, retractors, directors, excision director. Esmarch's bandage generally to be used. The following six directions are abbreviated from Erichsen: 1, Make incisions sufficiently free, and parallel to important parts, so as not to divide them; 2, economize length of bone by use of gouge; 3, leave epiphyseal cartilage in children; 4, do not open medullary canal in adults; 5, keep periosteum; 6, do not confound new bone or bone softened by inflammation, but otherwise healthy, with diseased bone, etc.

PROCESS OF REPAIR AFTER EXCISION.—This is entirely analogous to the process of repair after compound fractures.

SPECIAL EXCISIONS.

ANKLE-JOINT, EXCISION OF.—Disease should be limited to ends of leg-bones and to astragalus. *Operation.*—Incisions two: one internal, along edge of inner malleolus; the other, external, along posterior border of lower two inches of fibula, around outer malleolus and as far forward on outer side of foot as within one inch of base of fifth metatarsal bone. Saw and nip off inner malleolus through inner incision. Dissect soft parts sufficiently away, pulling peronei tendons backward and downward, and keeping close to bone to avoid posterior tibial artery. Cut off outer malleolus; push tibia out of external wound, and saw off its articular surface. Next remove part or whole of astragalus, according to its condition. Dress the wound and place the limb on a firm splint. *Result.*—Generally good. Often a movable joint. Fatality 1 in $5\frac{1}{2}$, success greatest when disease is of traumatic origin.

ELBOW, EXCISION OF.—In this joint, excision, if practicable, always preferred to amputation. A matter of opinion whether in mere suppurative, synovial disease, the results of excision or of natural cure are the best; but in necrosis, excision should be done. *Operation.*—Use a strong knife and ordinary saw. Longitudinal incision 5 inches long, right down to bone, with its centre opposite inner border of olecranon. Then with scalpel separate soft parts from bones, proceeding carefully between olecranon and internal condyle, and guarding ulnar nerve with nail of left

thumb. Divide lateral ligaments, push end of humerus out of wound and saw it off freely. Then project ulna and radius, grasp olecranon with lion-forceps, and saw both bones at level of neck of radius. Sometimes orbicular ligament can be preserved with advantage. Some do whole operation subperiosteally with aid of rasps. Subperiosteal resection of doubtful advantage. *Results*.—In good cases, a strong joint with all its natural movements. *After-treatment*.—Hinged splint. One contrived to permit supination and pronation useful. In a week's time, flex the elbow to a right angle. When wound is nearly healed, use passive motions.

HIP-JOINT, EXCISION OF.—Indications for operation. *See* DISEASE OF HIP-JOINT and GUNSHOT WOUNDS. *Operation*.—Incision, free semilunar with convexity backward over posterior border of great trochanter and down to bone. Follow neck of bone to head, open capsule, and let assistant, by adducting, rotating inward and pushing upward, project head of femur out of wound. Ligamentum teres may have to be divided. Joint very rarely found dislocated. If femur be diseased, saw below trochanter. Chain-saw useful. If acetabulum only be diseased, saw through neck of femur and gouge acetabulum, or cut it with pliers. Pelvic fascia thoroughly separates acetabulum from pelvis. Acetabular disease requires freer incisions. *After-treatment*.—Plaster apparatus; long splints with iron interruption; mere extension by weight and pulley; Sayre's wire breeches. In dressing the wound a stretcher, with a hole opposite the hip, like that of Mr. Croft, is useful. For heavy adults a stretcher contrived to slip easily, piecemeal, under the patient, and to leave the hips exposed, is very useful. The stretcher being slipped under the patient, is lifted up and placed with its two ends on two chairs beside the bed. A dressing-pan being placed on the floor, the wound can be syringed, if necessary, and dressed; while, in the meantime, the bed-sheets are changed or smoothed. *Prognosis*.—Many cases die, but probably not one-third of these perish actually from the operation. Without interference some of the successful cases would have perished of the original disease.

KNEE, EXCISION OF.—Indications. *See* DISEASE OF KNEE-JOINT.—Amputation almost always preferred for injury. *Operation*.—Nearly transverse incision below patella from back of one condyle to back of other, and dividing ligamentum patellæ. Throw up soft parts from patella and front of lower end of femur. Divide lateral ligaments on the condyles. Retract soft parts and project femur. Saw through condyles below the epiphyseal cartilage in children. Proceed very carefully, both in separating soft parts from back of condyles and in making the last cuts with the saw, or popliteal artery may be wounded. Now push end of tibia upward and forward, and saw it off close to articular surface in case of children. Make saw-cuts through the two bones so to correspond that limb may be straight. If they do not fit in this way after first sections, other sections must be made. Carefully secure all bleeding vessels. *After treatment*.—Put ap-

paratus on at once. Some fixed contrivance, like P. H. Watson's combination of anterior iron splint with paraffine or plaster-of-Paris bandage, is the best. Iron back-splint with foot-piece and interrupted side-splint. Bavarian splint. Salter's swing. Packard's splint.¹ Do not disturb limb for first few days. Recovery and repair are very slow, average eight months. Some surgeons leave patella. Ankylosis should be osseous. An outward bend of the limb is a common misfortune after this excision.

EXCISION OF OS CALCIS.—Lines of incision : 1. Along upper border of os calcis from inner side of tendo Achillis to a little in front of calcaneo-cuboid articulation ; this should divide the tendo Achillis. 2. Across sole of foot, from anterior end of first incision. Disarticulate from cuboid first, and from astragalus afterward. Beware of wounding posterior tibial vessels. A very useful foot results. *Prognosis* is excellent.

EXCISION OF SCAPULA.—Done for necrosis, caries, and morbid growth. Partial or entire. Crucial or T-shaped incision. Hemorrhage occasionally very serious. In removing the entire bone, divide the muscles attached to posterior border at an early stage of the operation, and leave the subscapular vessels till last. Tie the vessels as the operation proceeds. *Prognosis*.—Danger not so great as might be expected.

EXCISION OF SHOULDER.—Done for gunshot wounds and compound dislocations, and occasionally may be justifiable in cases of bone disease or innocent tumor. But, in cases of bone disease, the cure by natural ankylosis affords a perfectly satisfactory result, which is not improved upon by excision. *Operation*.—Incision. Longitudinal from just outside coracoid process downward and outward for five inches, right down to bone. Open capsule and divide muscles attached to tubercles of humerus, rotating outward while cutting internal rotator (subscapularis), and *vice versâ*. Arm should at same time be brought across chest. Pull tendon of biceps aside. Operator himself now seizes upper arm in his left hand and pushes head of humerus out of wound. Clean soft parts from line of saw-cut. Saw. If, upon opening the joint, amputation is judged expedient, make a circular incision at the lower end of the longitudinal one, and disarticulate. Excision may be performed with a flap-incision, raising the deltoid. Glenoid cavity rarely removed. *Prognosis*.—Very good. Useful limb. Fatality : of fifty cases, in seventeen the glenoid cavity was interfered with, and in thirty-three the head of the humerus only was touched ; of the seventeen, seven died ; of the thirty-three, only one died. But in military surgery, one in four died.

EXCISION OF TARSAL BONES.—See EXCISION OF OS CALCIS, above. Excision of these bones for disease requires a little knowledge of anatomy, and then the surgeon had best be left to adapt his incisions to the particular case. The astragalus may be removed very well by incisions similar to those

¹ See Medical Record, 74, approved by F. H. Hamilton and L. A. Sayre.

given for excision of the ankle-joint. Its excision gives excellent results. Excision of the smaller tarsal bones is often by no means a good substitute for amputation.

EXCISION OF WRIST.—Lister's method. Its description includes at least twelve directions, besides the application of Esmarch's bandage. 1. Make first incision (two are required) from dorsum of base of second metacarpal bone upward as far as base of styloid process of radius, always internal to extensor secundi internodii pollicis. 2. On the thumb side of this incision separate the soft parts from the bones, carefully because of *radial artery*. At the same time divide the extensor carpi radialis brevior. 3. Sever trapezium from rest of carpus with cutting-pliers. 4. Clean soft parts from bones on ulnar side of incision. 5. Make ulnar incision near anterior edge of ulna, and extending from two inches above styloid process to middle of fifth metacarpal bone. 6. Raise all the soft tissues completely from the dorsal surface of the carpus; then, of course, the two wounds communicate. In doing this the extensor carpi ulnaris should be severed from its insertion. 7. Clean anterior aspect of carpus and ulna, cutting off pisiform bone and hook of unciform bone, so as to leave them attached to the soft parts. Do not go so far forward as to wound *deep palmar arch*. 8. Divide ligaments and remove carpal bones (except trapezium) with forceps. 9. Clean and saw off ends of ulna and radius. All cartilage of radio-ulnar joint should be removed. 10. Cut off bases of metacarpals so far as they are covered with cartilage. 11. Take away trapezium and base of first metacarpal bone. 12. Cut off cartilage of pisiform and leave the rest, and the hook of the unciform, unless they be diseased. The operation may be shortly summed up thus: The whole carpus, except the pisiform and the hook of the unciform, and also the adjacent cartilage-covered parts of the radius, ulna, and metacarpal bones, are removed piece by piece, in the order found most convenient, through two longitudinal incisions, one ulnar and palmar, the other dorsal and radial. *Result.*—Very useful hand. *After-treatment.*—Very important. Large lump of cork under palm of hand. Flat wood palmar splint. Regular passive motion from the first. Encouragement to active motion.

Exostosis.—Two kinds of true exostosis, and two allied bony growths. True exostosis is either (1) spongy or (2) ivory. The allied osseous growths are the "exercise-bones," and other ossifications of tendons and muscles, besides the "diffused osseous tumor." *Causes.*—Usually unknown. Begin in youth, rarely after thirty; male sex. *Pathology.*—Spongy exostosis consists of cancellous bone covered with a thin layer of hyaline cartilage. The cartilage grows on its superficial surface, and keeps ossifying on its deep surface. Ivory exostosis has the structure of compact bone, but the Haversian canals are smaller, and the lacunæ less regular. Growth slow, and tends to stop, eventually, even without treatment. *Seat.*—Spongy exostosis; epiphyses of tibia, fibula, humerus, and femur, etc. Ivory ex-

ostosis: bones of face and skull, pelvis, scapula, and ungual phalanx of great toe. *Characters and Symptoms.*—They are recognized by their hard bony feel, their immobility and their position. The ivory exostosis is especially round, nodulated, and smooth. The neck of the tumor varies in size, and this is an important point in treating hard exostosis. They often cause aching and pain in the limb, and may be serious from pressure on important parts. *Treatment.*—They should be let alone, unless they cause great deformity or pain, or press upon important parts. For they often are dangerously near to joints, may even be covered by a pouch from the articular synovial membrane; and the hard exostoses of the skull sometimes require great violence to remove them. An incision should be made over the exostosis to be removed, and then saw, chisel, or cutting-pliers applied. It is said that the neck need not be removed. But Stanley writes: "Absolute security against the reproduction of an exostosis can be obtained only by the removal of every part of its circumference." If necessary, he adds, the potassa fusa or nitric acid may be used to produce exfoliation of the base of the tumor. Diffuse bony tumor may require amputation of a limb or extirpation of an entire bone, and even then it has been known to recur. Nothing can be done for "exercise-bones."

Extravasation of Urine.—When extravasation of urine is described as a distinct disease, it usually means that which is caused by the urethra bursting just behind a stricture. Rupture of the urethra from violence causes similar symptoms. Extravasation into the pelvis, or into the peritoneal cavity, may result from rupture of the bladder, *quod vide*. *Symptoms.*—Patient has a stricture of the urethra with retention. Sudden sensation of relief and, simultaneously, of something giving way in perinæum, succeeded by stinging, burning pain in the part. Then swelling successively of perinæum, scrotum, penis, and hypogastrium. Pain; fever, which soon assumes a low or "typhoid" character. Skin of parts affected dusky red or purple. Rapid sloughing wherever the extravasated urine finds its way. Oedema, emphysema. The retention itself is sometimes relieved by this accident. *Prognosis.*—In some cases the urine again begins to flow by the urethra, further extravasation ceases, abscesses form, and the sloughs are cast off—the patient recovering. But it is generally considered that, in most cases, operative interference is urgently demanded. Then there is still great danger, first, from the acute gangrene, etc., and, lastly, from the prolonged suppuration which ensues. The whole of both testicles may be denuded by the sloughing; but, if patient survive, the skin will heal and contract over them. *Anatomy.*—It is almost always the bulbous part of the urethra which gives way. Then the attachment of the deep layer of the superficial fascia to the posterior border of the triangular ligament, to the rami and body of the pubes, and to Poupart's ligaments, prevents any passage of the urine into the thighs, ischio-rectal fossæ, pelvis, or buttocks. *Treatment.*—Indications: 1, to relieve the original reten-

tion ; 2, to give vent to the sloughs and extravasation ; 3, to support the strength. To relieve the retention, a catheter should be passed, if possible, and left in. The retention is sometimes relieved by the free incision which should be made in the perinæum, to give vent to the urine and sloughs. This free incision should always be made. In making it, place the left forefinger in the rectum, to protect that structure, and cut upward in the median line in the direction of the urethra. If the extravasation is considerable, other incisions should be made. Over the incisions place a poultice, sprinkled with some antiseptic. To keep up the strength, give abundant nourishment, tonics, and stimulants.

Face, Wounds of.—Readily heal. Greatest care should be taken to prevent deformities. Replace even hopeless-looking flaps ; hare-lip pins ; horse-hair sutures. Removal of pins and sutures early, lest they themselves should cause scars.

Fever, Hectic.—The fever which results from and accompanies chronic diseases of an exhausting character. *Causes.*—Any chronic suppurative disease, especially abscesses connected with bone-disease which have opened externally. Empyemata, chronic suppuration of mucous tracts, of compound fractures, or of diseased joints, etc. *Pathology.*—Probably owing to the absorption into the blood of the products of inflammation or disintegration. *Symptoms.*—Remittent or intermittent daily. Temperature rises toward afternoon or evening ; red circumscribed flush on cheeks ; tongue dry ; skin dry and hot ; eyes bright ; slight excitement and sleeplessness. This stage is followed nightly by profuse sweats ; toward morning patient falls asleep ; on awaking he is still bathed in perspiration, but with the fever and high temperature either wholly or comparatively passed away. In the afternoon the same round of symptoms recommences. In the later stages of hectic, the “colliquative” sweats, as they are called, get more and more profuse and exhausting, and the fever often recurs twice a day ; the mouth becomes aphthous and the legs cedematous. Mental state usually clear throughout ; range of temperature generally between 99° and 102° ; diarrhœa is common. *Prognosis.*—Depends on the cause. *Treatment.*—If possible, remove cause, *e.g.*, chisel out carious bone ; make large abscess aseptic ; give abundant nourishment, but do not overpower the digestion ; quinine in 5-grain doses ; sulphuric acid, iron, opium, strychnine, astringents ; give opium cautiously ; its use is to relieve any coincident pain. Elevate the cedematous legs ; flannel bandages carefully applied to these limbs ; astringents for the diarrhœa.

FEVER, INFLAMMATORY (OR SURGICAL).—The fever which usually accompanies inflammations and injuries. No line can be marked out as separating this fever from septicæmia ; the two conditions pass imperceptibly into one another ; in applying either name to a given case, one considers whether the symptoms and facts point to the raised temperature, or to an

absorption of septic material as being the chief direct cause of the phenomena which the case presents. *Causes and Pathology.*—1, The blood being simply heated by passing through an inflamed and consequently heated part; 2, the blood being poisoned by absorption of some product of inflammation, whether decomposed or not. All the symptoms of inflammatory fever and of its ally, septicaemia, can be produced by injection of pus, putrid liquids, SH^2 , etc., into the blood or cellular tissue of animals.

Symptoms.—Usually within forty-eight hours, almost always within seven days of an injury, the following symptoms may appear: increase of heat, subjective, and evident also to the thermometer, frequent pulse, chilliness or rigors, furred tongue, sleeplessness, excitement, even slight delirium; urine high-colored, deposits urates; increased urea; bowels confined. The fever usually lasts a week. Persistence beyond a week denotes some complication, e.g., abscess or erysipelas. If a complication cause the symptoms to recur after once disappearing, we have “secondary fever.” *Prognosis.*—No danger from the traumatic fever itself, provided complications do not happen. In children, latent tuberculosis readily awakened by surgical fever (Paget). *Treatment.*—See the treatment of wounds and the prophylaxis of septicaemia. Saline refreshing drinks, fresh air, quiet, rest, etc.

Fistula.—See ANAL FISTULA, LACHRYMAL FISTULA, etc.

Flat-foot.—*Causes.*—Prolonged standing or excessive walking in persons of weak and relaxed fibre, synovitis of ankle, injury to ankle, gonorrhoeal rheumatism of ankle, genu valgum. *Pathology.*—The ligaments which brace up the arch of the instep are lengthened, the head of the astragalus sinks through relaxation of the calcaneo-scapoid ligament, and the scaphoid tuberosity projects excessively; in bad cases the metatarsus is turned more or less outward, and the other edge of the foot turned upward by the peronei; ankle bends inward, hence the name talipes valgus. *Treatment.*—Steel spring or india-rubber pad under arch of foot, the former being let into sole of boot; internal upright bar to support inner ankle; bad cases of talipes valgus require a horizontal bar for the attachment of straps to correct abduction of metatarsus. Even division of peronei occasionally required. Always strengthen general health; avoid standing; and exercise systematically flexor muscles. Mr. Willett and myself have succeeded in nine cases out of ten at least, merely by judicious exercise of the leg-muscles (Evans's plan) combined with an india-rubber bandage properly applied to the instep and ankle.

PERFORATING ULCER OF FOOT.—Usually begins beneath a corn, tends to perforate to dorsum of foot, is often attended by peculiar affection of the nerves of the foot diseased, and is sometimes so difficult to cure as to lead to amputation. Treat on general principles. *Vide* ULCER and SINUS.

Fracture, Varieties.—The main peculiarities of fractures are expressed by the terms *complete, incomplete, simple, compound, impacted*. Complete fractures classified into *transverse, oblique, longitudinal, dentate,*

multiple, and comminuted. Incomplete include *fissure, infraction, splintering, perforation.* The usual name for infraction is *green-stick fracture.* Lastly may be added *separation of an epiphysis.* *Causes.*—Predisposing: 1, an exposed situation, *e.g.*, that of *ossa nasi*; 2, bones of right side break oftener than those of left; 3, rough occupations of male sex; 4, adult age—bones of children are soft and less brittle; 5, rickets; 6, osteomalacia; 7, absorption of part of thickness of bone by ulceration or abscess or tumor. Exciting causes are either: 1, direct, or 2, indirect violence, or 3, muscular action. *Symptoms.*—1, Pain; 2, swelling; 3, ecchymosis; 4, crack felt or heard by patient when fracture occurs; 5, abnormal mobility; 6, displacement; 7, crepitus; 8, loss of function (“paralysis”) of the limb; 9, injury to neighboring soft parts, *e.g.*, compression of brain by fracture of skull. 8 and 9 are classed together as “*rational*” symptoms, the rest being called “*sensual*.” Abnormal mobility is the only pathognomonic sign. One or more of the above list may be absent, *e.g.*, an impacted fracture presents neither crepitus nor abnormal mobility. Swelling is due to extravasation of blood at first, and afterward often to œdema and slight inflammation. Displacements are of several kinds, *viz.*:—angular, transverse, longitudinal, and rotatory. In longitudinal displacement the fragments usually overlap and thus cause shortening. In rare cases they are pulled asunder; thus lengthening, of course, results. A good example of rotatory displacement is that which causes eversion of the foot in fracture of the neck of the femur. Besides impaction, displacement of the fragments or intervening blood may prevent crepitus. The soft crepitation caused by effusions, especially those into tendinous sheaths, also the grating of certain rheumatic affections, must not be mistaken for crepitus. *Diagnosis* is rarely difficult except when only one of two mutually supporting bones is broken, or when there is impaction. In the former case there is little or no deformity, in the latter no crepitus or increased mobility. Careful measurement, inspection, or palpation usually settle the question. *Prognosis.*—Simple fractures, when properly treated, almost always recover without deformity. In some bones, *e.g.*, the clavicle, slight deformity is to be expected. Compound fractures are liable to numerous serious and sometimes fatal complications. The chief of these are: 1, decomposition in the wound; 2, extensive gangrene of crushed or dead parts; 3, progressive suppuration; 4, accompanying protracted, exhausting fever; 5, erysipelas; 6, septicæmia; 7, pyæmia; 8, tetanus; 9, delirium tremens. The prognosis of a compound fracture may be to a great extent inferred from what will be written about the question of amputation. Occasionally a fracture resists all ordinary means employed to procure union—“*united fracture.*”

UNION IN FRACTURE.—In the first week the surrounding soft parts are found swollen and the seat of inflammatory effusion. More or less blood is extravasated about the fracture and in the medullary cavity at the same

point. Amount of escaped blood very variable. During the third week the corpuscles or leucocytes which crowd the effusion, produce either fibrous tissue or cartilage. Later still, soft young bone appears in—1, the medullary cavity; 2, beneath the periosteum; 3, outside the periosteum in the periphery of the fibrous or cartilaginous swelling round the ends of the bones (which swelling is called “callus”). A new periosteum forms outside the callus. The bony callus consists entirely of spongy substance. Subsequently the medullary cavity is restored, the excess of new bony uniting material removed, and that which remains gradually becomes compact and hard. When firmly and steadily set and supported, fractures unite directly, new bone only being formed between and not around the fragments. In other words, there is then no “provisional callus.” Very little callus in flat bones; very little external, but a good deal of internal (*i.e.*, inside the spongy spaces), in spongy bones. The new ossification is usually in fibrous tissue in adults, but is preceded by cartilage in children. The cells which are the agents of the process escape from the blood-vessels. Complete ossific union requires a period of one to two months. Restoration of the medullary canal and absorption of the external or provisional callus requires four or five months more. Union in compound fractures results from organization and ossification of granulations which grow from the ends of the bones and from the neighboring periosteum. The process is essentially the same as that of union of simple fractures. Frequently the ends of the fragments die, and then the sequestra are cast off by the growth beneath them of granulations which absorb the hard parts of the adjacent living bone. Granulations possibly dissolve the lime salts of bone by developing lactic acid. Many compound fractures have the external wound healed so rapidly, that they really unite just like simple fractures. A bare piece of bone does not usually begin to granulate till about eighth to tenth day. In meantime, it is of a yellow color. Dead bone is white or gray or blackish. Compound fractures require for uniting three times as long as simple fractures.

DELAYED UNION AND NON-UNION OF FRACTURES.—Occurs naturally in some situations, as in intracapsular fracture of neck of femur, ditto of neck of humerus, fracture of olecranon, and of patella. *Causes.*—Predisposing: 1, bad nutrition; 2, debility from repeated hemorrhage; 3, specific diseases of blood, *e.g.*, scurvy, the continued fevers; 4, cancerous cachexia; 5, osteomalacia. Local causes are: 1, too loose a dressing; 2, too large a gap of bone to fill up, perhaps owing to loss of a large portion; 3, too early motion. Too loose a dressing, and repeated meddling with and disturbing a fracture, are by far the commonest causes. In ununited fracture, as the condition is called, there is usually fibrous union, sometimes a new synovial membrane and actual false “joint.” It is rare for there to be no union at all between the fragments.

Treatment of Simple Fracture.—Three main indications: 1, reduction

or setting ; 2, keeping in proper position till firm union has taken place ; 3, prevention or treatment of complications. Setting ; extension, counter-extension, manipulation, relaxation of muscles by flexion of joints or by anæsthesia, occasional propriety of dividing tendons. Compound fractures with protrusion may require skin wound to be enlarged or end of projecting fragment to be sawn off. Apparatus : two kinds, "fixed" and "movable." The "fixed" are such as plaster-of-Paris, starch bandage, gum and chalk, moulded mill-board, gutta-percha, poro-plastic, leather, Hyde's felt, etc. The "movable" are the ordinary fracture-box, Cline's splints, Liston's splint, McIntyre's splint, etc. The difference in the two varieties consists in this—the "fixed" apparatus is moulded specially to the individual case to which it is applied, while the "movable" splints can be adapted by fitting and padding to various successive cases. Some of the so-called "fixed" are not less movable than the other class. To all these may be added the inclined plane, extension by weights or elastic bands, support by sand-bags, etc. Great difference of opinion as to relative value of the above apparatus. Many English, and more Continental surgeons apply a solid firm dressing, such as the starched bandage and mill-board, as soon as possible after the occurrence of a simple fracture, and after most compound fractures too. Other English surgeons teach that this is dangerous. In applying such a firm dressing, attend strictly to the following rules : 1, place no bandage next the skin ; 2, line thickly with cotton wool or wadding ; 3, include the joints both above and below the fracture ; 4, leave the toes or fingers bare, and never fail to examine them carefully twenty-four hours after applying apparatus. Indications for cutting up apparatus wholly or partially are : severe pain anywhere beneath it ; signs of obstructed circulation in toes or fingers, or looseness of the apparatus. Starched bandages tend to loosen and require trimming. In adjusting any fracture-apparatus, carefully avoid disturbing fracture. Starched bandage requires twenty-four hours to dry, plaster-of-Paris takes a quarter of an hour to set ; borax will retard, and common salt hasten, setting of latter. Leather, poro-plastic, and mill-board are softened in hot water before moulding. Starch should be applied with palm of hand after bandage has been put on dry. Leather and gutta-percha are better adapted to angular parts, *e.g.*, shoulder, than is mill-board ; but gutta-percha is rather dear, and leather very dear. Salter's swing. Cradle to keep off bed-clothes. With the use of a fracture-box or Cline's splints, correct position is obtained by pads of lint or cotton-wool. For time of each application, *vide* SPECIAL FRACTURES. Itching of skin is relieved by cleanliness, olive oil, etc. Severe pain may require morphia subcutaneously ; but it is usually a sign that apparatus requires readjusting. Pain should never be neglected.

COMPOUND FRACTURES.—*Special Notes on Their Treatment.*—Question of amputation. Consider, 1, cause of fracture (was there much crushing or

twisting force?); 2, main arteries or veins torn? 3, amount of hemorrhage; 4, condition as to collapse, reaction, etc. Depth and extent of bone-injury should also be considered. Injury to nerves, even large ones, not of much account. Rupture of large artery not an absolute indication for amputation. Will the limb be useful, even if patient does recover, or will it be in the way?

Always treat the wound in a compound fracture very gently. After first dressing and cleaning, never probe or touch it if possible till the wound is quite fistulous. Then, if necrosis is found, treat it like necrosis from osteitis. A firm starched or plastered bandage, applied as soon as possible after accident, is the treatment. It should be thickly lined with cotton wadding. Dress the wounds either by Lister's strict plan or with oakum. Extensive discharge or large wounds may require a fracture-box, interrupted or not. Generally, windows in a plaster bandage suffice. Attend to complications as they arise. "Immersion treatment."

Treatment of Ununited Fracture.—1, Rubbing fragments together; 2, blisters or iodine externally; 3, firing neighboring skin; 4, acupuncture needles left for a few days in the false joint; 5, electro-puncture; 6, seton; 7, scraping ends of fragments with a tenotomy-knife; 8, excision of ends of fragments; 9, scraping back periosteum and then excising; 10, sutures; 11, driving in ivory pegs; 12, metal screws. But in many cases, the prolonged application and skilful management of a plaster bandage are sufficient. Attend to general health. Give phosphates.

Fractures United with Deformities.—*Treatment.*—If there is malposition in a compound fracture, and the wound is healing rapidly, do not try to rectify till the wound is healed. Remedies for obliquity are bandaging, extension by weights, manipulation, re-breaking (by flexion or extension), cutting operations. Two cutting operations: 1, subcutaneous osteotomy. Small incision down to bone. Gimlet-hole through bone. Insert key-hole saw, and saw partially through, first one side, then the other. Lastly, break the bone in two. 2. Antiseptic osteotomy. Of course bloody operations are dangerous, but the danger is very small with antiseptic treatment.

SPECIAL FRACTURES.—*Acetabulum, Fracture of.*—*Causes.*—Great violence applied to femur. *Varieties.*—Two. *Firstly*, fracture of rim of acetabulum; crepitus, dislocation of femur, probably easy to reduce, but very difficult to keep in position. *Secondly*, fracture through bottom of acetabulum. Head of femur may be driven through acetabulum into pelvis, and even impacted. And there are, very likely, severe injuries to neighboring parts. *Treatment.*—Extension; rest; long splint, weight, or fixed apparatus. *Prognosis.*—Shortening of limb may be expected.

Acromion, Fracture of.—*Signs.*—Flattening of shoulder; inability, entire or partial, to raise arm; crepitus; arm feels to patient as if dropping off; the fragments can be felt separated. *Prognosis.*—Union is not

unlikely to be ligamentous. *Treatment*.—Support elbow well, so as to make use of head of humerus for a splint. Fix the arm as firmly as can be done without binding it too closely to the side.

Clavicle, Fracture of.—*Causes*.—Almost always indirect violence, *e.g.*, falls on shoulder. *Situation*.—1 (most common), great concavity; 2, acromial end, between or external to coracoclavicular ligaments; 3, sternal end (inside rhomboid ligament very rare). *Character*.—Oblique, when from indirect violence in adults; transverse in children; transverse or comminuted from direct violence. *Displacement*.—1, Fracture in middle of bone—outer fragment downward and inward beneath inner fragment, the acromial end being rotated forward; 2, fracture of acromial end outside coracoclavicular ligaments—outer fragment strongly forward, inward, and slightly downward. Fracture between conoid and trapezoid; deformity almost nil, or else as in last variety (Gordon); 3, fracture of sternal end inside rhomboid ligament—outer fragment horizontally forward, simulating dislocation.

Additional Symptoms.—Flattening of shoulder, prominence of inner fragment, crepitus, inability to raise arm, tenderness. *Complications*.—Occasional injury to subclavian vein or brachial plexus. *Treatment*.—Three indications; 1, keep shoulder and scapular fragment outward; 2, correct rotation forward of shoulder; 3, elevate shoulders. Best results from recumbent, supine position, for two or three weeks. Bandages, pads. Many special apparatus.

Coccyx, Fracture of.—*Causes*.—Parturition, falls, and blows. *Treatment*.—Regulate bowels. Rest.

Colles's Fracture.—See FRACTURE OF RADIUS.

Coracoid Process, Fracture of.—*Causes*.—Blows; dislocation of humerus. *Prognosis*.—Ligamentous union to be expected, it is said. *Treatment*.—Rest. Biceps and coracobrachialis to be relaxed by flexing elbow and bringing arm across front of chest. Uncomplicated fracture of coracoid process is extremely rare.

Facial Bones, Fracture of.—*Cause*.—Direct violence. *Prognosis*.—Almost equally good in both compound and simple fractures. Great deformity is sometimes unavoidable. *Treatment*.—See FRACTURE OF NASAL BONES, etc.

Femur, Fracture of.—Three main divisions: 1, of upper extremity; 2, of shaft; 3, of lower extremity. 1. Fracture of upper extremity, three subdivisions, *viz.*: *a*, intracapsular fracture of neck of femur; *b*, extracapsular fracture of neck of femur; *c*, fracture of the trochanters not involving the neck.

Fracture, Intracapsular, of Neck of Femur.—Fracture altogether within capsule of hip-joint. *Causes*.—Predisposing—old age, consequent senile atrophy and lessened obliquity of neck of femur. Exciting cause, very trifling, *e.g.*, slight fall, or even turning in bed. Almost all intracapsular

fractures occur in old age. More common in female sex. *Signs*.—1, loss of power: limb cannot be raised from the bed (except in rare cases); 2, flattening in region of trochanter; 3, trochanter rises above Nelaton's line; 4, it moves, on rotation, in an arc of a circle smaller than on the sound side; 5, crepitus; 6, tenderness; 7, eversion (except in rare cases); 8, shortening, $\frac{1}{2}$ to 1 inch at first, later on, owing to capsule giving way, sometimes $2\frac{1}{2}$ inches. *Pathology*.—Lower fragment usually outside upper. Very little extravasation. *Union*.—By fibrous tissue. Sometimes *nil*, rarely osseous. *Diagnosis*.—See EXTRACAPSULAR FRACTURE. *Prognosis*.—The unavoidable confinement to bed in some cases depresses the system fatally. In any case lameness and shortening are to be expected. *Treatment*.—Bed for two or three weeks. Pillows beneath knee. Then leather or poro-plastic splint to hip; crutches and gentle attempts to use. In strong constitutions, attempt to obtain firmer union by longer rest and use of starch bandage. Good diet. Water-bed.

Fracture, Extracapsular, of Neck of Femur.—Two kinds: 1, *simple*; 2, *impacted*. Fracture wholly, or partially outside capsule of joint. *Cause*.—Direct and considerable violence. *Signs*.—Firstly, when not impacted: 1, inability to raise limb; 2, bruising and swelling of hip, indicating great extravasation; 3, crepitus at great trochanter, which may sometimes be distinctly felt to be in several pieces; 4, great pain and tenderness; 5, usually very marked eversion, sometimes inversion; 6, shortening, $1\frac{1}{4}$ to $2\frac{1}{2}$ or even $3\frac{1}{2}$ inches. Secondly, *impacted* fracture. *Symptoms* less marked than if there is no impaction. Less eversion; little or no crepitus, only slight shortening, not more than an inch. But there is local tenderness, followed in a day or two by thickening over great trochanter. *Treatment*.—Extracapsular fracture is to be treated on similar principles to those applied in treatment of fractured shaft of femur. Seek for union by securing immobility with Liston's splint, etc. Compress trochanter with a belt round hips.

Fracture of Trochanter Major.—*Signs*.—Local pain, tenderness, crepitus, eversion, no shortening. Fracture of this without fracture of neck or shaft of femur almost unknown.

Fracture of Shaft of Femur.—Classified according to position, whether in upper, middle, or lower third. *Signs*.—Typical signs of fracture. *Displacement*.—In upper and middle thirds the upper fragment inclines forward and usually outward, lower fragment inclines inward and is rotated outward. Causes of the displacement are: 1, muscular action of psoas, iliacus, adductors, etc.; 2, lower fragment forces upper fragment outward at time of accident. *Treatment*.—1, position merely; 2, Liston's splint; 3, double inclined plane; 4, extension by a weight; 5, anterior splint; 6, starched bandage or other fixed apparatus. 1. *Position*.—Lay limb on outer side, with knee bent. In infants, merely lay limb straight out in bed, taking weight of clothes off with a cradle (preserve body-

warmth in latter case). 2. Liston's splint.—Length, it should reach from a hand's length below heel to a hand's breadth below axilla. Pad ankle well. Turn bandage twice round ankle and instep, then fix foot to splint. Avoid crushing the small toes. Bandage to just above the knee with figures-of-eight. "Kettle-holder" on inner aspect of thigh. Perineal band. Extension and setting. Apparatus for combining Liston's splint with continuous extension by elastic bands or by weight and pulleys. Sand-bags. Bottom of bed should be level. 3. Double-inclined plane. 4. Extension by weight.—Stirrup of wood and plaster. Strapping extending up to the knee. Bandage over strapping. Raise foot of bed on blocks. Weight consists usually of sand-bags or tins of shot, 5 to 10 lbs. 5. Anterior iron splint.—May be combined with a plaster splint. 6. "Fixed" apparatus: plaster-of-Paris, starch bandage, etc. Unless attended to with great vigilance, liable to have very bad results in fractured thigh. The hip should be thoroughly fixed—not an easy matter. *Fracture of femur, lower third*, that is, near knee-joint.—Upper end of lower fragment projects backward. Hence these cases should be treated with the knee semi-flexed.

Compound Fracture of Femur.—Very dangerous. But amputation for it is extremely fatal. Treat each case according to its own peculiarities.

Fibula, Fracture of.—Tibia acts as a splint, making diagnosis difficult. Seek for crepitus and increased mobility by pressing fibula at different points against the tibia. Occurrence frequent. *Treatment.*—Cline's (side) splints, or some immovable apparatus. Fracture of fibula about two or three inches above ankle, with rupture of internal lateral ligament and dislocation of foot outward is called "Pott's Fracture." See DISLOCATION OF ANKLE.

Fracture of Forearm may be of radius or ulna separately, or of both bones. See FRACTURE OF RADIUS, ULNA, etc.

Humerus, Fracture of.—Nine kinds, viz.: 4 of the upper end, 1 of the shaft, and 4 of the lower end.

Intracapsular of Neck of Humerus (anatomical neck, of course).—*Cause.*—Direct violence. *Signs.*—Those of a severe injury to the shoulder-joint, causing paralysis, swelling, etc., but very little shortening ($\frac{1}{2}$ inch) or deformity. Indeed, this fracture is diagnosed by the absence of the marked symptoms of other fractures and of dislocation. Often *impacted*. When not impacted, there is crepitus. *Prognosis.*—Expect bony union, with, very likely, excess of new bone. *Treatment.*—Pad in axilla, leather shoulder-cap, bandage, and sling. Whole arm should be bandaged gently and evenly. Sling should support hand rather than elbow in all fractures of humerus. Impacted fractures not to be disturbed.

Extracapsular Fracture of Neck of Humerus, i.e., through surgical neck. *Signs.*—Sharp end of lower fragment projects into axilla or beneath coracoid. But head of humerus remains in glenoid cavity. Distinct crepitus.

Shortening, 1 inch. Pain from irritation of brachial plexus. *Prognosis*.—In rare cases the bone atrophies. *Treatment*.—Bandage limb from finger upward. Pad in axilla. Carry elbow forward and inward. Apply a leather cap to shoulder and outer side of upper arm. Support hand, but not elbow, with a sling. Erichsen's bent leather splint.

Separation of Upper Epiphysis of Humerus resembles accident last described, but the upper end of the shaft forms a remarkable and smooth projection beneath the coracoid process. The patient is usually very young, and must be less than twenty. *Treat* like fracture of surgical neck.

Fracture of Great Tuberosity.—*Cause*.—Direct violence. *Signs*.—Increased breadth of shoulder. The tuberosity is dragged backward by the muscles inserted into it, and the head of the humerus forward beneath the coracoid (a semi-dislocation) by the pectoralis major, etc. Crepitus. *Treatment*.—Pad in axilla and leather cap on shoulders, or rest in bed with the arm extended.

Fracture of Shaft of Humerus.—*Causes*.—Direct violence, falls upon the elbow, and, not rarely as compared with other bones, muscular action. *Signs*.—Typical. *Treatment*.—Two or three splints, one being an angular elbow-splint. Support hand, but not elbow, in a sling. Stromeyer's cushion for compound fracture of humerus (*vide* Bryant's "Surgery," p. 942). Danger of delayed union in fracture of shaft of humerus.

Fracture of Lower End of Humerus.—Four kinds: 1, transverse fracture; 2, fracture of either condyle; 3, fracture between the condyles into the joint (this is always combined with transverse fracture); 4, separation of the epiphysis. *Causes*.—Usually, falls on the bent elbow. *Signs*.—1, Of transverse fracture. It may be either above or below the condyles. The symptoms are given in the following diagnosis between it and the injury with which it is most frequently confounded, viz., dislocation of radius and ulna backward:

THE FRACTURE.	THE DISLOCATION.
1. Crepitus.	1. No crepitus.
2. Easily reduced, but deformity at once reappears.	2. Not so easily reduced. But then does not reappear.
3. Prominence of lower end of upper fragment of humerus projects forward <i>above</i> the bend of the skin in front of the elbow-joint.	3. Prominence of lower articular surface of humerus projects forward <i>beneath</i> the bend of the skin in front of the elbow-joint.
4. Internal condyle in normal relation to olecranon.	4. Distance increased between internal condyle and olecranon.

2. *Signs of fracture of condyles*. Pain. Crepitus produced by direct manipulation, and by pronation and supination of forearm.

3. *Signs of fracture between condyles into joints*. Pain. Crepitus. Effusion into joint perhaps considerable. The pathognomonic sign is the increased breadth from condyle to condyle.

4. *Signs of separation of epiphysis*. Like those of transverse fracture;

but the crepitus is softer, and the patient is necessarily young. In every obscure case of injury to the elbow, make the patient place his hands one above the other upon his head, then bring his elbows together and compare them, using your eyes and fingers. *Treatment* of fractures of lower end of humerus. Reduce and put up in lateral angular splints, with elbow at right angles and hand in sling. When elbow tends to displacement backward, apply angular splint behind, and a short splint in front of humerus. Passive motion in three weeks—in one week if the fracture extends into the joint. *Complication* of fracture of humerus, injury of musculo-spiral nerve. See INJURIES OF NERVES.

Hyoid Bone, Fracture of.—*Causes.*—Direct violence: rarely muscular action. *Signs.*—Crepitus, etc., with difficulty in swallowing, speaking, and sometimes even in breathing. Reduce with one finger in patient's mouth.

Jaw, Lower, Fracture of.—*Cause.*—Great and direct violence. *Situation.*—Order of frequency, near canine tooth, at angle, at symphysis. Neck of condyle and coronoid process are very unusual places. Occasionally multiple. *Signs.*—Pain, tenderness, mouth can scarcely be opened, saliva dribbles, crepitus, deformity; frequently bleeding, for the fracture often opens through the mucous membrane of the mouth. *Prognosis.*—Union often slow. *Treatment.*—The interdental splint cannot be too strongly recommended. It should almost always be used. See that no tooth or foreign body lies between the fragments, if the fracture is an open one (see Lyon's "St. Bartholomew's Hospital Reports," 1879). Wire round teeth damages them. Thomas drills the fragments and inserts a silver suture.

Leg, Fracture of.—See FRACTURE OF TIBIA AND FIBULA.

Metacarpus and Metatarsus, Fractures of.—*Causes.*—Direct violence. *Treatment.*—On general principles.

Nasal Bones, Fracture of.—Occasional emphysema from coincident injury to frontal sinuses. Difficulty in reduction and in preventing deformity. A smooth silver female catheter may be inserted into the nostrils and used to raise the depressed bone. Adams' and Gamgee's apparatus for preserving the position of the bones. Vulcanized india-rubber dilator introduced empty and then filled with water has great power to raise a flattened nose. Above remarks apply both to fracture of nasal bones and of septum.

Patella, Fracture of.—Two kinds, one transverse and usually the result of muscular action, or muscular action combined with violence; the other stellate, Y-shaped, or, perhaps, quite simple, but not transverse, and always caused by direct violence. The former fracture often occurs in missing a step whilst walking down-stairs, or in some similar and trivial manner. In it the fragments generally separate widely, while in the stellate fracture there may be little or no separation. Consequently the former always

ends in fibrous union, the latter frequently in bony union. Sulcus between fragments in the transverse fracture. Great swelling and effusion into knee-joint. Inability to extend knee. *Treatment*.—Rest in horizontal position or with heel raised. Straight splint along back of limb. Elastic straps to pull upper fragment downward and lower upward. Figure-of-eight bandage. Callender's arrangement of weight, strapping, and pulleys. Malgaigne's hooks. Malgaigne's hooks fixed into plaster after Spence's plan. No doubt one of the chief indications is to reduce the effusion into the knee-joint without delay. It has been recommended to do this with the aspirator; but it can be effected to a great extent by bandaging and compressing, using plenty of cotton-wool. Hence a starch and mill-board apparatus is useful.

Compound Fracture of Patella.—Very serious indeed, but not always requiring amputation.

Pelvis, Fractures of.—May occur in part or parts of the os innominatum, but, for practical purposes, are best classified into those which injure a large part of the bone, *e.g.*, the body or rami of the pubes, and those which merely chip off a prominence like the ant. sup. spine of the ilium. The former are very serious, from the violence often done to the pelvic viscera, especially the bladder. *Cause*.—Usually a vehicle passing over the part. *Signs*.—Crepitus, pain (inability to stand, in the first or serious class of cases). Often signs of ruptured bladder, urethra, or rectum. *Treatment*.—Pass a catheter to examine the state of the bladder. Rest in bed. Bandage round hips and knees. Sometimes displaced parts may be set by manipulating with the finger in the vagina or rectum. *See also* FRACTURE OF ACETABULUM, RUPTURE OF BLADDER, etc.

Radius, Fractures of.—1, Of head; 2, of neck; 3, of shaft; 4, of lower extremity. The first three are caused usually by direct violence, and present usual signs of fracture, *viz.*, crepitus, pain, etc. Unless the ulna is broken also, there is little deformity. *Treatment*.—For first three cases: An angular splint to fix elbow and extend along back of forearm. Forearm midway between pronation and supination. Short splint along palmar surface of forearm. Splints should be flat and wide, so as to prevent bandage from squeezing radius and ulna together. Fingers to be left free. The fourth case, *viz.*, fracture of lower end of radius, is called

Colles's Fracture.—*Causes*.—Falls on outstretched hand. Very rarely direct violence. Especially frequent in old women. *Signs*.—Peculiar spoon-shaped deformity. Prominence of styloid process of ulna. Crepitus generally absent, or at least indistinct. Dorsal prominence is nearer the hand than palmar prominence. Pain severe. Power of supination or pronation lost. *Anatomy*.—Upper fragment occasionally impacted into lower; lower sometimes comminuted. Dorsal prominence formed by lower fragment, palmar prominence by flexor tendons stretched over lower end of upper fragment. Position of fracture generally about one inch above

carpal articular surface of radius. *Prognosis*.—If the deformity can be removed and the fracture perfectly set at first, all should be well. Otherwise, deformity will be permanent, and stiffness of the wrist and fingers may continue for many months. *Diagnosis*.—From dislocation of the wrist-joint, by the fracture's not altering the distance between the styloid processes and the knuckles. *Treatment*.—Every effort to be made to reduce and set properly at commencement. Extension and counter-extension. Bruce Clarke dissected a specimen in which reduction was easy, if the extensors of the thumb and carpus (radial side) were first relaxed by appropriate movements of the hand and thumb. Apparatus used are of three kinds: First, Nélaton's pistol-shaped splint, applied along palmar side separately, or along dorsal side in conjunction with a short splint on palmar side of shaft of radius. Thick dorsal pad opposite lower fragment. Palmar pad thickest on radial border (the word palmar applies here to the arm only, not the hand). Passive exercise of fingers after second week. Second, long straight posterior and short anterior splint, padded like Nélaton's apparatus. In this case the hand is often left entirely free, so that the fingers may be exercised, and the weight of the hand may keep the radial side of the wrist extended. Third, Gordon's splints. Hand kept in prone position. Two straps. No bandages. Ridge on radial side of palmar splint. "Overhanging lip" on radial side of lower end of dorsal splint. Gordon says that impaction is uncommon in this fracture. Lower fragment of radius occasionally, but rarely, displaced forward instead of backward. Dr. L. S. Pilcher demonstrates that in Colles's fracture the strong periosteum on the back of the radius remains untorn, and is the main obstacle to the reduction of the fracture. To relax it, bend back the hand and wrist. Then make slight extension in the line of the forearm, accompanied by moderate pressure on the dorsum of the lower fragment. Reduction is thus effected. The only apparatus Pilcher uses are a broad band of adhesive plaster round the seat of fracture, and a sling to support the arm. I can recommend this plan from my own experience.

Radius and Ulna, Fracture of Shaft of.—Treat like fracture of either bone singly. Green-stick fracture not uncommon. Splints to be wide, and to be applied whilst hand is supinated.

Ribs, Fracture of.—*Causes*.—Predisposing: old age. Immediate are of three kinds: 1, direct violence; 2, indirect violence, the chest being compressed at one part the rib gives way at another, just as a spring or a stick might; 3, muscular action, as from violent coughing or severe labor. *Situation*.—Usually the convexity of the rib a few inches in front of angle. Middle ribs most frequently broken, first and second ribs rarely, because protected by clavicle. *Signs*.—Catching pain on inspiration or coughing. Tenderness. Crepitus. Crepitus sometimes difficult to get, especially when the fracture is beneath the thick muscles of the back. Press alternately with the fingers of each hand, one on one side, the other on the other

side of the supposed fracture. Take care to apply both hands to the same rib. Breathing shallow and abdominal. Other symptoms often arise from complications, *e.g.*, hæmoptysis. *Complications*.—1, Emphysema; 2, pneumothorax; 3, hæmothorax; 4, hæmoptysis; 5, wounds of heart, pericardium, or great vessels; 6, wounds of intercostal vessels; 7, etc., wounds of diaphragm and abdominal viscera, liver, or spleen. 1 and 2 imply a wound of the lung; 4 implies either a wound or bruise of the lung. Emphysema is far the commonest complication. Practically, cases of fractured rib are classified into those without and those with injury to the lungs. Secondary complications are inflammations and empyema. *Diagnosis*.—When crepitus cannot be obtained, consider generally all the symptoms present. *Prognosis*.—If there is no visceral injury, speedy union with formation of provisional callus may be expected. If there is visceral injury, then prognosis depends on its nature and amount. The danger in such cases is threefold: firstly, shock; secondly, hemorrhage; thirdly, inflammation. *Treatment*.—Broad bandage round chest, prevented from slipping down by braces of bandage across shoulders. Strapping all round chest, or extending merely from spine to sternum over injured side. In some cases, bandaging appears to press the sharp ends of the fragments inward; it is then, of course, contraindicated. In bad cases, rest in bed for a few days and moderate diet. For treatment of complications, *see* articles HEMORRHAGE, INJURIES OF THORAX, LUNGS, etc. Treatment lasts a month.

Sacrum, Fracture of.—*Causes*.—Either severe crushing force applied to the whole pelvis, or else gunshot wounds. *Prognosis*.—Very bad. *Treat* each case with its complications on general principles.

Scapula, Fracture of.—*Varieties*.—Four, viz., 1, of body; 2, of neck; 3, of coracoid process; 4, of acromion (*see* FRACTURE OF ACROMION AND OF CORACOID).

Fracture of Body of Scapula.—*Causes*.—Severe direct violence. *Signs* (often obscure).—Pain, loss of power, crepitus, irregularity in spine of scapula if fracture passes through that process. *Treatment*.—Bandage pad over scapula, elbows supported by a sling. *Prognosis*.—Deformity not unlikely.

Fractures of Neck of Scapula.—Two kinds, viz., 1, of anatomical neck, *i.e.*, external to coracoid; 2, of surgical neck, *i.e.*, internal to coracoid process. In fracture of the anatomical neck, the symptoms resemble those of dislocation of the head of the humerus into the axilla; but the deformity produced by the fracture, though easily reduced, at once recurs, and there is also crepitus. Still, even these points will not distinguish fracture of the anatomical neck of the scapula from dislocation of the humerus with fracture of the glenoid fossa. Fracture of the surgical neck can be recognized by bearing in mind that the coracoid process goes with the separated neck, and is detached from the body of the scapula. All fractures of the necks of the scapula are excessively rare. *Treatment*.—Raise the elbow

with a sling, and keep the parts at rest with a pad in the axilla and a bandage round arm and chest.

Sternum, Fracture of.—*Causes.*—Great direct violence ; rarely indirect ; occasionally, even muscular effort during labor. *Signs.*—Deformity, pain, mobility, etc. *Treat* like a broken rib.

Tibia, Fracture of.—When the shaft of this bone is broken, the fibula remaining entire, the deformity is almost or quite *nil*, and other symptoms are very mild. Trace ridge of shin carefully with forefinger. Best *treatment*, a plaster case. *Separation of upper epiphysis* may cause arrest of growth. *Fracture of internal malleolus* is generally combined with dislocation of foot inward or outward, *quod vide*.

Tibia and Fibula, Fracture of (Fracture of Leg).—*Commonest Situation.*—Junction of middle and lower third. *Causes.*—Violence, direct or indirect, sometimes slight. Rare in children. *Signs.*—Typical and unmistakable. *Deformity.*—Upper fragment projects forward and inward in most cases. Tendency to eversion of foot (as in almost all fractures of lower extremity). *Treatment.*—Handle carefully and set at once, because of danger of converting simple into compound fracture, through sharp end of upper fragment piercing skin. Set with great toe in line with inner border of patella, so that recovery may not take place with eversion of foot. Keep straight the line of the anterior border of the tibia. Anæsthetize, if necessary. Division of tendo Achillis perhaps required in rare cases. *Apparatus.*—1. Starch bandage and mill-board, plaster-of-Paris, Bavarian splint, or some other fixed apparatus. See general article on FRACTURES, above. 2. Cline's splints (common lateral ones with foot-pieces). 3. Fracture-box, *i.e.*, two plain side-splints with back-piece furnished with foot-board. 4. McIntyre's splint. 5. When there is much tendency to antero-posterior displacement, laying limb on its outer side, with knee and hip flexed, is often successful. 6. Anterior wire-splint. With most of these apparatus, some form of swing may be advantageously used. Keep foot at right angles to leg. Duration of treatment, usually five weeks before patient's limb may be trusted in a mere light gum and chalk case.

Compound Fracture of Leg.—Two kinds: firstly, when a fragment pierces a moderate wound in skin from within outward ; secondly, when the wound is very large, or when it is produced by severe, crushing, external violence. Practically, most cases can be thus classed, and the latter are very much more serious than the former. Do not attempt to do what is called "close the wound, and convert it into a simple fracture." If the case is slight enough, you will not be able to prevent it from closing itself, unless you are meddlesome. Support the whole limb by plaster bandaging over a layer of cotton wool, and immediately over the wound and its neighborhood apply oakum, to absorb all discharge. Protect skin and wound from irritation of tar in oakum by greasing with zinc ointment ;

or use Lister's antiseptic treatment. So-called "open treatment" is scarcely more open as regards the wound than a thick layer of porous and absorptive material like oakum; though, of course, it is open enough to noxious influences floating about the sick-room. But it is only just to say that the "open treatment" has had excellent results under Humphry and others. Hemorrhage can almost always be restrained by pressure. For complications, erysipelas, abscess, pyæmia, etc., see articles on those subjects.

Ulna, Fracture of.—Three kinds—1, shaft; 2, olecranon; 3, coronoid process. *Shaft.*—Treat like fracture of shaft of radius. *Fracture of Olecranon.*—*Causes.*—Falls on elbow; rarely muscular violence. *Signs.*—Swelling, ecchymosis, and tenderness. Fragment drawn up by triceps. *Treatment.*—Anterior splint, thickly padded in bend of elbow, so that the limb may be slightly flexed. Passive motion in fifth week. *Result.*—Union often ligamentous. *Fracture of Coronoid Process.*—Excessively rare. Ulna dislocated backward from trochlea, easily reduced, but slips back again directly. *Treatment.*—Posterior angular splint, straight splint in front of humerus.

Frost-Bite.—Frost-bites vary in degree as much as burns and scalds. *Signs.*—In severe cases: tingling, numbness, coldness, stiffness, white or mottled appearance. Reaction is accompanied by inflammatory symptoms, and by gangrene in the severer cases. The gangrene may be either immediate, when it will be of the dry variety, or secondary to the inflammatory symptoms, when it will be moist. *Treatment.*—Resembles that of burns; but the greatest care is required in restoring circulation to the frost-bitten part. Cold room, friction with snow, or cold flannel or fur. Stringently avoid hot water, fires, etc. In those cases where persons exposed to cold are overcome with sleep, they should not be suddenly carried into a warm atmosphere. Use friction and gradual warmth.

Ganglion.—Two kinds, *simple* and *compound*. *Simple* is said to arise from a cystic enlargement of a cell in one of the fringes of synovial membrane lining the sheath of the tendon (Paget), and it is also said to be originally a partial "hernia" of the sheath of the tendon (Billroth). Any way it is rarely found communicating with the tendon-sheath at all. It is a fibrous sac, containing a fluid, usually jelly-like, sometimes quite serous in consistence. *Situation.*—Most frequently over extensor tendons at back of radial side of wrist. *Appearance,* globular, hard or fluctuating, transparent swelling. It causes feeling of weakness and often pain. *Treatment.*—1. Rupture. Place patient's wrist on your knee, then steady it with your fingers, while you squeeze, with ends of both your thumbs, the ganglion against a ridge of bone, beneath it. 2. Iodine paint or blistering. 3. Pressure. 4. Subcutaneous puncture. Follow up both 1st and 4th method of treatment with pressure by pad and bandage.

COMPOUND PALMAR GANGLION is a dilatation of a considerable part of a tendon-sheath, or of several tendon-sheaths. *Situation.*—Palm of hand and

lower part of forearm just above annular ligament. Similar compound ganglia occasionally found in foot. *Signs*.—Fluctuating swelling above and below anterior annular ligament; crackling from melon-seed bodies usually contained within. *Treatment*.—1. Puncture with a trocar large enough to let melon-seed bodies pass through its canula. Wash away these bodies by injection with warm water. Inject tinct. iodini, $\bar{3}$ iss. + aqua $\bar{3}$ iss. Let injection escape after two minutes. Then apply compress, splint, and bandage. 2. Incisions above and below annular ligament. These should be longitudinal. Antiseptic dressing very advisable. Gently remove melon-seed bodies by syringing with weak carbolic lotion.

Gangrene.—The term signifies the death of a part of the soft tissues of the body. The dead part is called a “*slough*,” and the term “*sloughing*” is often applied indifferently to the diseased action which results in the slough and to the reparative process by which the slough is afterward cast off. *Varieties*.—Two main classifications: 1, into *dry* and *moist*; 2, into *traumatic* and *idiopathic*. *Causes*.—A. Of traumatic gangrene: 1, *mechanical violence*, e.g., crushing and disintegrating action of a cart-wheel passing over a limb; 2, *mechanical pressure*, e.g., bed-sore, and strangulation of a limb by a tourniquet; 3, *chemical*, e.g., the effects of corrosive acids, or excessive heat or cold, or of extravasated urine. B. Idiopathic gangrene has for its remote causes the following: 1, *general anæmia*, e.g., gangrene has been known to follow excessive venesection; 2, *arterial obstruction* from *embolism* or *thrombosis* in cases of *atheroma*—this form usually occurs in old people, and is called *senile gangrene*; 3, *specific fevers* and their sequelæ, especially typhus, typhoid, and septicæmia; 4, *certain diseases*, mostly inflammatory, e.g., *carbuncle*, *phagedæna*, etc.; 5, *poisons* inoculated or swallowed, e.g., *ergot of rye*, *serpent's poison*, etc. Certainly many of the above causes, and probably all, act either by diminishing the supply of blood to the part, or by obstructing its escape from the part, or by both ways combined. Gangrene produced purely by diminished blood-supply is dry; that caused partly or wholly by obstructed return of blood is moist. *Inflammation* is an aggravating element in most cases of gangrene, and an essential element in many. Two or more of the above causes are frequently combined; e.g., senile gangrene results often from a wound of the toe of an old person with atheromatous arteries. *Pathology* may be inferred to a great extent from what has been said above concerning the causes, and what will be said below about the symptoms. The appearances are primarily those of a region where the vessels are either almost empty or else distended with stagnant blood. Then, in the part itself, if blood can pass through it at all, but always in its immediate neighborhood, inflammation occurs. Now, if the part is exposed to the air, it next begins to decompose, and one should notice that most of the so-called appearances of gangrene, e.g., foul odor, are really signs of putrefaction in the gangrenous tissues. For a time, the inflammatory and gangrenous process spreads. When it reaches its

limits, the inflammation on its borders produces granulations between the living and dead regions, which granulations, as it were, push off the dead structures. In gangrene of embolic origin, emboli are found in the arteries. The line where the gangrenous process stops and the wall of granulations is formed, is called the *line of demarcation*.

Symptoms and Course.—1. Dry gangrene. First appearance often a brown spot on one toe; this spreads, the parts affected gradually shrivelling up, the skin wrinkling, and becoming brownish black. This process is called “mummification.” 2. Moist gangrene begins with signs of inflammation. Then the swelling becomes boggy, skin mottled or violet. Bullæ. Discoloration spreads and deepens. Local insensibility. Fall of temperature locally. Emphysematous crackling. Foul odor. Extent of process varies from part of toe to a whole limb. Either of above series of symptoms observed in senile gangrene. Traumatic gangrene is always more or less moist and inflammatory. If patient survives, the dead parts are cast off in the way described above (*Pathology*), the tendons and fasciæ giving way last but one, and the bone absolutely last. Process of spontaneous separation of any segment of a limb occupies months. *Constitutional Symptoms*.—In traumatic gangrene, those of great prostration and fever of a low type. In senile gangrene, they may be very slight, but usually they are those of chronic septicæmia, viz., gradual exhaustion, feeble pulse, dry tongue, nervous sensibility dulled, etc. *Diagnosis*.—Gangrene must be distinguished from ecchymosis caused by blows, and from lividity the result of exposure to cold. *Prognosis*.—Bad, unless part affected is small or a line of demarcation has formed. Worse when from constitutional than when from purely local causes.

Treatment.—When only a small part, e.g., the end of a finger, is affected, and when the cause is traumatic, treatment is purely local, otherwise it is also constitutional. *Local treatment*.—Two objects: 1, to promote detachment of the gangrenous parts; 2, to prevent the gangrenous parts from decomposing, and thus infecting the patient and his chamber or ward. Use absorptive compresses of tow or oakum, wet with chlorine water, carbolic lotion, etc., but not too wet. Charcoal powder. Iodoform. Never drag off sloughs. Remove them gently when they are fully formed. After separation of dead parts, treat like an ordinary granulating wound.

Question of Amputation.—It is a very safe rule in civil practice never to amputate till a line of demarcation has formed. Leave single toes to fall off. “If the whole foot or leg be affected, do the amputation so that it may be merely an aid to the normal process of detachment; i.e., on the borders of the healthy parts you try to dissect up only enough skin to cover the stump, and saw the bone as near as practicable to the line of demarcation” (Billroth).

Constitutional Treatment.—Relieve pain with opium (up to gr. $\frac{1}{2}$ every three hours) or morphia, subcutaneously. If these disagree, use chloral

(gr. xx. 6th horis) or some other anodyne. Watch their effect well. Extent to which you give or withhold stimulants and nourishment depends on relative importance you attach to remediable weakness and inflammation respectively, as factors in extending the gangrene. Nourishing food, quinine, acids, gentian, camphor, or ammonia, are used as a rule; but Syme declared that in senile gangrene he got the best results from comparatively low diet.

Prophylaxis.—For gangrene threatening from excess of tension, use free incisions. Gangrene from arterial obstruction, local warmth. Gangrene from venous obstruction, elevation of limb, support by gentle, even bandaging.—*See also* BED-SORES. In severe crushes, where gangrene seems inevitable, it is better to amputate before reactionary fever has set in, unless indeed the limits of the parts hopelessly injured cannot be sufficiently made out.

Gastrotomy.—A term applied to two distinct operations, viz.: 1, opening the stomach; 2, opening the abdominal cavity only.

GASTROTOMY, or operation of making opening into stomach. Called "*gastrostomy*" when done for disease of the œsophagus. *Indications.*—1. When a foreign body has entered the stomach, and cannot safely either pass through the pylorus or be vomited or extracted by the mouth. 2. When an impervious stricture of the œsophagus is of traumatic origin. Indication is then imperative. 3. In cases of cancer of œsophagus. In these, though death has always speedily followed operation, yet patient's sufferings have been much relieved. *Prognosis.*—Usually followed by speedy death when done for disease of the œsophagus,¹ but very safe (1 death in 11) when done for foreign body. In former case, death is more from advanced disease than from operation. *Operation.*—Scalpel, forceps, ligatures, director, hooks, catch-forceps, retractors, handled needles, silk ligatures, bits of bougie for quilled-suture. Incision, curved for 4 inches, just internal to edge of left costal cartilages, from sternal extremity of seventh intercostal space, downward and outward. Divide successive layers on a director. Edge of left lobe of liver may be useful as guide to stomach. Pull stomach out with finger and thumb. When quite certain of having got the right viscus, seize it with catch-forceps, if gastrostomy is to be done. Two double ligatures from side to side through lips of wound and wall of stomach. Open viscus. Pull ligature loops out of wound and divide them. Quills inside and out. Additional sutures at corners of wound. Unless patient is much exhausted, feed by enemata only for first twenty-four hours at least. When operating to remove foreign body, make opening in stomach small, and sew up with continuous suture unless opening spontaneously closes.

¹ Two successful cases: Verneuil's, see *Lancet*, January 13, 1877; and Stanton's, see *Medical Press and Circular*, December 29, 1880. Both were dressed antiseptically.

Gleet.—See GONORRHEA.

Glioma.—See TUMORS, SARCOMATOUS.

Glottidis, Œdema.—See LARYNGITIS.

Goitre.—See BRONCHOCELE.

Gonorrhœa.—*Definition.*—Inflammation of mucous membrane of male urethra or of female genitals, following impure sexual intercourse. I have worded the definition as above, because, in practice, one applies the term gonorrhœa to any urethritis following impure intercourse, whether there be specific contagion or not. *Causes.*—1. Specific infection by contact with gonorrhœal or gleet secretion. 2. Irritation or infection by non-specific secretion from a diseased mucus surface (?). *Symptoms and Course.*—Four stages. 1. *Premonitory.*—Itching, swelling, and stickiness of meatus: occurs about two to seven days after intercourse, and lasts twenty-four hours, more or less. 2. *Inflammatory.*—Scalding, discharge of pus, painful erections, chordee, tenderness along urethra, or confined to part actually inflamed. Occasionally spasmodic retention. Glans and prepuce swollen: sometimes phimosis or paraphimosis. Duration one week to one month. 3. Inflammation passes gradually away, but a thick discharge remains. 4. When only a thin serous discharge remains, called *gleet*. *Pathology.*—Redness, swelling, etc., of mucous membrane of urethra. Occasionally slight excoriation or ulceration. Micrococci and vibriones have been found in gonorrhœal pus, and perhaps infest the inflamed membrane itself. Parts chiefly affected, fossa navicularis and bulbous part. Cause of chordee, effusion of lymph into corpus spongiosum, which effusion prevents lower border of penis from extending proportionally during erection. *Complications.*—Bubo, balanitis, phimosis, paraphimosis, hemorrhage, cutaneous rash, gonorrhœal rheumatism, epididymitis, cystitis, prostatitis, retention of urine, chordee. All but chordee are noticed in separate articles. *Treatment.*—Local and general.—Local is effected by (1) injections; (2) soluble bougies of cacao butter (Sir H. Thompson and Mr. W. T. Cooper¹) or of “ice” (Abrath); (3) insoluble bougies, *e.g.*, wax, ivory, etc.; (4) clay bougies (Chiene); (5) powders insufflated (Wilders, *Lancet*, vol. i., p. 73). There are also external local applications, such as cold sitz-bath, ice to perinæum, blisters (Milton), etc. *Rules for Injecting.*—Pass the nozzle into the urethra, right up to the hilt, and press it home. Hold the glans close up to it with the left finger and thumb. Inject slowly about half a

¹ As cacao-butter bougies melt as soon as they enter the urethra, they differ little from a thick fluid injection. They have these advantages, that they are sure to *enter* the urethra, and that they remain there, but they do not *distend* the urethra, as a properly administered fluid injection does, for several minutes. A soft and flexible bougie which will slightly distend the urethra as long as may be desired can be made as follows: Roll a square piece of antiseptic gauze, like a pipe-light, dip it into medicated cacao-butter, or into medicated vaseline thickened by mixing with sperm or firm paraffin. Use for gleet only.

drachm. (There need be little or no fear of mischief from an ordinary injection entering the bladder. It is unlikely to get so far at all.) Retain the injection three to five minutes if possible. In most cases inject after each urination. *Injections*.—As a basis, “strong” tragacanth mucilage is excellent. It will remain in the urethra all night. The many urethral injections which have been used successfully may be classed, more or less accurately, as (1) antiseptics, (2) astringents, (3) sedatives, (4) cleansing. Antiseptics: iodoform (gr. xxx. to tragacanth. emuls., $\bar{3}$ j.), carbolic lotion (1 to 40), permanganate of potash (gr. j. to $\bar{5}$ x.), chloralum (gr. iij. to $\bar{5}$ j.), borax (gr. v. to $\bar{3}$ j.), zinci chlor. (gr. j. to $\bar{5}$ j.). With these might be classed also solutions of iodine, chlorate of potash, and many also of the astringent injections, which are both astringent and antiseptic. Glycerine is constantly combined with injections of all kinds, and its value possibly lies in its power of checking fermentative changes. Secondly, astringent injections: tannic acid (gr. v. to $\bar{3}$ j.), zinci sulph. (gr. ij. to $\bar{3}$ j.), zinci sulpho-carbolat. (gr. ij. to $\bar{3}$ j.), zinci acet. (gr. ij. to $\bar{5}$ j.), plumbi acet. (gr. ij. to $\bar{3}$ j.), argent. nit. (gr. $\frac{1}{4}$ to $\bar{5}$ j.). Also solutions of kino, catechu, and eucalyptus gum. Thirdly, sedative injections: sedatives are almost always used in combination, e.g., liq. morph. acet., \mathbb{M} . x.; glycerini acidi tannici, \mathbb{M} . xx.; aquæ, $\bar{3}$ j. Fourthly, cleansing injections, such as warm water, used in very acute gonorrhœas. Many excellent injections are combinations. Such a one is the French injection of M. Brou, containing probably calamine, opium, and some vegetable decoction. Powders, such as zinci oxid., in suspension, are believed to cling to the urethral surface.

Soluble bougies can be medicated with any of the above substances. It is customary to place a piece of lint or cotton-wool over the meatus after passing the bougie, and to fix it with strapping.

Insoluble bougies are sometimes dipped in an active agent, sometimes used unmedicated, for gleet.

Modifications in Treatment according to the Stage of the Disease.—First stage. “Abortive Treatment.” Rest as much as possible; at all events avoid fatigue. Moderate diet. No stimulants. Frequent cold hip-baths; saline purgatives; alkaline and demulcent drinks; acetate of potash; weak astringent and antiseptic injections repeated as often as possible (acid. tannic, gr. v.; glycerini, \mathbb{M} . xx.; aquæ, $\bar{5}$ j.). Second stage. General treatment same as first stage. But be more cautious about introducing irritants into the urethra. Treat complications. For chordee: belladonna extract along outside of corpus spongiosum, morphia and henbane suppositories; warm baths; sleeping draught at night. Sp. camph., $\bar{3}$ ss. doses, internally. One minim of tinct. aconiti every hour will sometimes cut short this stage. Third stage. Still prohibit stimulants and avoid fatigue. Persevere with injections; vary them if the case be obstinate. For use of copaiba, etc., see below. Fourth stage (that of gleet). Continue injections and general treatment, but improve diet. Change of air. Tonics,

e.g., iron, quinine, strychnia, gentian, etc. But gleet is so often kept up by a slight stricture, that it is imperative to examine well the urethra in obstinate cases, and to dilate it if necessary. It is a good rule, in treating gonorrhœa, to inject after every act of micturition. Persons away from home all day should use the compressible metal tubes, filled with injection, and having a nozzle to enter the urethra, made, at my request, by Mr. Cooper, of 26 Oxford Street. They should be carried in the coat side-pocket. Mr. Watson-Cheyne urges that, in treating a gonorrhœa, the first thing to aim at should be the destruction of the specific nature of the disease. To effect this he recommends a bougie (iodoform, gr. v. ; ol. eucalypti, gr. v. ; ol. theobromæ, q. s.). Patient passes the bougie, and lies down for six hours. Follow up with injections of emulsion of eucalyptus oil till a slight simple urethritis remains. Then resort to some ordinary astringent injection. The chief difficulties in curing a gonorrhœa arise from the disobedience or impatience of the patient, who relaxes his attention to his disorder as soon as it begins to improve, whereas he ought to persevere with the treatment even for a week after the disease is apparently quite cured. Within that period, even half a glass of claret may cause a relapse. The following rule is of prime importance. The surgeon should teach the patient how to inject. He should administer the first injection himself ; and, if it be effectively done, this first injection may strike the death-blow of the gonorrhœa. A suspensory bandage should be worn as a prophylactic against epididymitis. The ordinary one is often quite useless. The bandage made by Messrs. Arnold, of West Smithfield, should be used. To absorb the discharge, and keep the linen clean, an excellent application is a thin layer of absorbent cotton-wool, stuck to gutta-percha tissue, and tied to the penis by a piece of tape. Chastity is necessary in the first three stages. Gleet is not always infectious, but abstinence from intercourse is desirable even during this stage.

Copaiba, Cubebs, and Oil of Sandal Wood.—Copaiba not advisable in the acute stage, cubebs best in first stage, oil of sandal wood good for any stage. Dose of copaiba, 2 capsules three or four times a day, or 3 gr. of the balsam made into an emulsion with yolk of egg, or floating on infusion of roses, three times a day. Dose of cubebs: a heaped teaspoonful four times a day mixed with soda-water. Cubebs and copaiba together ; make the cubebs up into pills with copaiba balsam and white wax, and give ten pills three times a day. Dose of sandal wood ; ℥. xv., ter die. ℞. Ol. santalini, ʒ ss.; sp. vini rect., ʒ iss. M. ft. mist. S.— ʒ j. ex aquæ. ʒ j., ter die.

Copaiba rash is papular, and sometimes resembles urticaria, sometimes measles ; but there is no fever, and the rash is patchy, chiefly affecting skin over joints. Warn patients of danger of gonorrhœal ophthalmia.

GONORRHOEA IN FEMALE.—*Parts affected.*—Vagina and vulva. Disease may spread considerably, even up urethra to bladder, and, it is said,

through Fallopian tubes to peritoneum. Other complications are bubo, labial abscess, and warty growths. Less common are metritis and ovaritis. *Treatment*.—Main special points are, to use large quantities of weak injections pumped freely into vagina, to insert a piece of clean lint between the labia after each injection, and to prescribe rest, both local and general.

Groin, Chief Surgical Diseases of.—See table in Holmes's "System," vol. v., p. 999. 1. Psoas abscess; 2, glandular abscess; 3, abscess from diseased hip; 4, simple abscess; 5, enlarged glands; 6, cysts; 7, encysted hydrocele; 8, common hernia; 9, incarcerated hernia; 10, strangulated hernia; 11, retained testis; 12, varix of saphena vein; 13, aneurism; 14, malignant disease; 15, other tumors. Of these, hernia alone is sometimes resonant on percussion. Common hernia and varix of saphena are alone completely reducible. Psoas abscess, encysted hydrocele, and retained testis are or may be partly reducible. Abscesses, cysts, varix, and aneurism may fluctuate. Abscesses (excepting psoas), inflamed glands, and inflamed aneurism show heat, redness, etc. Impulse on coughing may be found in hernia and psoas abscess, and, much more rarely, in cysts, strangulated hernia, retained testis, and some tumors. Holmes's table is worth committing to memory.

Gums are affected by *abscess* (so-called gum-boil), by *ulceration*, and by *hypertrophy*. *Abscess* arises from irritation of carious tooth. Foment; open when abscess has fairly formed; attend to teeth. *Ulceration* is caused by mercury, scurvy, syphilis, and, indeed, any other cause of stomatitis. Remove cause. Wash with pot. chlorat.; paint with sol. argent. nit., gr. x. to ʒj., or touch with solid argent. nit. Tonics and pot. chlorat. internally. *Hypertrophy* may require outgrowth to be snipped off.

Gunshot Wounds.—Belong to the class of contused wounds. *Causes*.—1, Mere explosions of powder; 2, wadding; 3, small shot; 4, bullets and slugs; 5, cannon-balls; 6, splinters of shells.

Pathology and symptoms are most conveniently described together under the head of *Characters*.—Four chief forms of gunshot wound, viz.: 1. Simple contusions, caused by spent shot, or by "oblique impact." Formerly attributed to "windage." May produce most severe internal injuries with no visible damage to skin. 2. Superficial wounds, grooving, not tunnelling the flesh. 3. Where bullet lodges. Particles of clothing, etc., may enter with it. 4. Where the bullet pierces and escapes. Though bullet escape, foreign bodies carried in with it may remain. Rifle-bullets, as distinguished from musket-bullets, make cleaner and less contused wounds, but smash and splinter bones, and pierce the body with a more straight and undeviating course. They also cause greater shock. *Shock*.—Depends much upon individual constitution. Is usually great. *Pain* usually slight, often unnoticed. *Hemorrhage*.—Primary is rarely serious, except when the largest vessels are wounded. Secondary is very common,

perhaps because of bad sanitary conditions to which an army is exposed. *Burns* from powder may occur at close quarters. *Examination.*—First see how many wounds there are. Then, at least in civil practice, examine patient's clothes. Apertures in them may indicate the direction of the wound; the absence of a piece of cloth may suggest its presence in the wound; or the exit of the bullet may, in rare cases, be proved by its being found in the clothes. Then explore the wound with the finger carbolized. But in gunshot wounds of the chest or abdomen, the surgeon should insert neither probe nor finger, unless he is prepared to follow up his search, if necessary, by operative measures. Place the patient in the attitude in which he received his wound; its direction can thus be better judged. Examine carefully once for all. Counter-manipulation with the fingers of the other hand to assist the finger in the wound. *Instruments for Detection of Bullets.*—Nélaton's probe (porcelain head). De Wilde's electric bell indicator. Krohne and Sesemann's electric indicator. Lecompte's stilet-pince, which bites a piece off the supposed bullet. *Objects of Examination.*—1, To search for foreign bodies; 2, to ascertain direction and extent of wound; 3, to estimate amount of injury done to certain parts, *e.g.*, fractured bones.

Apertures of Entrance and of Exit.—Former is cleaner and smaller than latter, smaller even than the ball which made it. Latter is everted and larger and lacerated. The quicker the passage of the ball the less are these differences; and they are sometimes *nil*. Only part of a bullet may have escaped by the aperture of exit if a bone has been struck. Or a split bullet may make its exit in two places. Bullet may rebound from a bone and fall out of aperture of entrance. Course of slow bullets sometimes very peculiar. *Healing.*—1. Small ring-shaped slough and gangrenous shreds thrown off. 2. Granulation and suppuration. Opening of exit usually closes before that of entrance. *Prognosis.*—Depends entirely on amount and position of injury. "The extensive tearing and crushing caused by large missiles do not differ from other large crushed wounds caused by machinery." *Treatment.*—Principles of treatment same as those of other contused wounds; differences of detail chiefly depend on peculiarity of surrounding circumstances.

1. In battle, check hemorrhage by pressure, apply extemporized splints to fractured limbs, give stimulants in case of syncope, and convey patient to place of first dressing.

2. Apply first dressings at a place previously selected. Here also remove all foreign bodies that are near the surface, and amputate limbs hopelessly crushed. Attach to each patient, before sending him on from here, a card with short account of his case, stating, *e.g.*, whether ball has been extracted or a wound of the trunk is or is not perforating. Field officers should ligature, if possible, every wounded vessel of importance (Longmore).

3. Convey patient to hospital. Here examine every patient, operate, dress wounds, bed, and diet. Many wounded should not be kept collected in one place. *Extraction of Bullet*.—Tiemann's forceps. Coxeter's extractor. If violent measures would be required for removal of bullet, let it remain, unless it is obviously setting up irritation. *Dressing*.—The main point is not to actively close the wound, but to leave free room for the discharge to escape. Tenax and oakum very good.

GUNSHOT WOUNDS OF SPECIAL PARTS.—*Head*.—Very dangerous, from the diffused injury done to the brain and its membranes. Inner table fractured more than outer. Frequent complication with meningitis, abscess, etc. Gunshot wound of brain almost always fatal. Fracture with depression usually fatal. *Treatment*.—Perfect rest, darkness, low diet. Cold locally. Venesection may be useful. Trephining contraindicated. Do not mistake a wound in which part of outer table of skull has been ploughed off for fracture with depression.

Thorax.—Classification, diagnosis, complications, etc., much the same as other wounds of chest. Non-penetrating wounds of any violence almost sure to bruise lung. Penetrating wounds fatal nine times out of ten. *Treat* like other wounds of chest. Allay firstly hemorrhage, secondly inflammation. To check bleeding from an intercostal artery, a large piece of linen is laid over wound, "and the middle portion of this linen is pressed into the wound by the finger, so as to form a kind of pouch; this pouch is then distended by sponge or lint pushed into it until the pressure arrests the bleeding; on stretching out the corners of the cloth the pressure of the plug will be increased" (Longmore).

Abdomen.—Resemble wounds from other causes. But even non-penetrating wounds often fatal. *Penetrating* wounds. Ball may pierce more than one viscus. The chief sign, sometimes the only sign, of penetration is the extreme collapse. Recovery may take place; then often a fecal fistula. Gunshot wounds of bladder have often recovered. Proposal, in case of injured viscera, to open the abdomen, search, clean, and suture.

Extremities.—Injuries to soft parts only, usually do well, unless some large artery or nerve be struck. Injuries to *bones* are remarkable for comminution, and frequency of longitudinal fissure into joints. Consequent great liability to osteomyelitis and blood-poisoning. Impossible to be so conservative in treatment as is usual in civil practice. The rule is to amputate for fractures in middle and lower third of femur. Put up most other fractures in immovable plaster case. In gunshot injuries of extremities, as of other parts, ordinary rules of surgery apply, only bearing in mind the smashing and splintering and the special difficulties in after-treatment. Hence, excision of knee and hip condemned by experience. Shoulder, elbow, and ankle suitable for excision. Put up excisions in immovable plaster cases. In some cases of wounded knee-joint, an attempt

may be made to save the limb; here again a plaster case is necessary. Fractured thighs not to be transported far to hospital.

Hæmatocele.—Effusion of blood into tunica vaginalis. Sometimes unnecessarily classified into traumatic and spontaneous. Almost always traumatic, the *cause* being a blow or puncture. It is likely that hæmatocele is often caused by a rupture of a varicose vein. Slight violence is in many cases sufficient to produce this. Witness the cause of Miss Neilson's death—ruptured varix of Fallopian tube during an attack of gastralgia. Hence blood escaped into peritoneal cavity. When a varicocele ruptures, the blood, fortunately, is more likely to enter a less important serous sac, the tunica vaginalis. *Pathology.*—Tunica vaginalis contains blood, which usually remains fluid, only becoming gradually darker and thicker and full of fibrinous shreds. Sometimes it coagulates more or less. Tunica vaginalis thickens. At any period inflammation and suppuration may supervene.

Symptoms.—Gradual but rapid formation of a smooth, globular or pyriform, hard or semi-fluctuating, non-transparent, heavy tumor. Testicle situated usually below and behind; on firm pressure in that region, the peculiar testicular pain is felt. Marks of bruising may appear in skin. Painless, except when quite recent. *Diagnosis.*—From 1, solid innocent enlargement of testis; 2, solid malignant tumor of testis; 3, hydrocele.

Case 1. Chronic orchitis begins usually with acute orchitis, or there is a history of syphilis or scrofula; it comes on more gradually than hæmatocele. Case 2. Cancer begins more gradually, but enlarges more persistently, and is painful; lumbar glands enlarge sooner or later in cancer. In both chronic orchitis and cancer thickening of cord is common. Case 3. As even hydroceles may be opaque, unless there is a history of severe violence followed by a sudden swelling and ecchymosis, a final diagnosis cannot be made without the trocar. *Prognosis.*—Only mild and recent cases offer any reasonable hope of absorption. Old cases, after reaching a certain size, usually remain stationary. Inflammation may occur at any time. *Treatment.*—1. When hæmatocele is recent. Rest in bed, application of cold, elevation of pelvis and scrotum. 2. Later: tap with trocar and canula, and then support with pressure. 3. In old cases with thick walls, or in any case when suppuration occurs, incise freely and empty.

Do this antiseptically. Operation not without danger. *Hæmatocele* of the tunica vaginalis of the cord occurs but very rarely. Symptoms, etc., can easily be inferred. Blow on part, ecchymosis, swelling, etc.

Hæmatoma.—*See* TUMORS.

Hæmaturia.—*See* URINE.

Hæmophilia.—Hemorrhagic diathesis. A congenital tendency to free bleeding after trifling injuries, or even no injury at all. Mostly hereditary. Want of fresh air, of dry lodging, and of exercise said to increase the diathesis. Attacks males more than females. *Symptoms and Course.*—Bleeding from nose and mouth, with or without obvious exciting

cause. Spontaneous ecchymosis beneath the skin. Bleeding often preceded by premonitory symptoms, such as vascular excitement, smell of blood in nostrils, and pains in limbs. In intervals of hemorrhages, joints swell and even inflame. Loss of blood produces anæmia. *Pathology*.—"Probably abnormal thinness of the arterial walls" (Billroth). *Prognosis*.—Most patients die young. Some seem to outlive the malady. *Treatment*.—Employ every means to strengthen general constitution. To check hemorrhages use ordinary means, and, in addition, in serious cases, give sodæ sulphatis, $\frac{3}{4}$ ss., occasionally, and two to five grains of ergot every half-hour. Turpentine in drachm doses. See Legg on Hæmophilia.

Hemorrhage.—Hemorrhages are classified in several ways, viz., firstly, according to their source, into 1, arterial; 2, venous; 3, capillary; and 4, parenchymatous. "Parenchymatous" is a term applied by the Germans to hemorrhage from the tissues full of small arteries and veins, e.g., the penis and the tongue. Secondly, hemorrhages are classified, according to the time of their occurrence, into 1, primary (i.e., at time of wound); 2, intermediate or recurrent (within a few hours); 3, secondary (i.e., a few days after wound). A third classification is into 1, traumatic; 2, spontaneous (*vide* HÆMOPHILIA). Surgeon-Major Porter described an intermittent hemorrhage from malarial influence. Arterial hemorrhage contrasted with venous hemorrhage: Arterial is florid and spurts in jets; venous is dark, and either does not spurt rhythmically at all or does so only in relation with the acts of respiration. Arterial, however, is dark when respiration is interfered with; and venous is florid sometimes, when it wells up from a deep wound and is thus exposed to the air before becoming visible. *Natural Checks to Hemorrhage*.—Arterial hemorrhage is stopped naturally by 1, active contraction of vessel; 2, passive contraction, consequent on decrease of total quantity of blood in system; 3, weakening of heart caused by loss of blood; 4, obstruction of vessel by clot. The first three are, one or other, more or less accessory to the operation of the fourth cause. Venous hemorrhage is stopped partly by causes similar to those which check arterial hemorrhage, and partly by the action of the valves in the veins. Capillary hemorrhage is stopped by the contraction of the connective or other tissues in which the vessels are embedded, and by coagulation. Hence, when these tissues are diseased, capillary and also parenchymatous hemorrhage may be very troublesome. *Pathology*.—Natural changes in and around a wounded vessel. *a.* If wound be partial and transverse, the wound gapes; bleeding is considerable and has to be checked ultimately by clotting, which may not occur till syncope comes on and predisposes to it. *b.* Wound longitudinal. Wound does not tend to gape. Hemorrhage is, therefore, more easily checked by coagulation and contraction. *c.* Wound completely dividing artery. 1. The ends of the artery retract into the sheath, sometimes curling or twisting up; 2, the ends contract; 3, coagulation takes place within the artery; 4, coagulation occurs outside the artery, within and

sometimes without the sheath ; 5, organization of the clot or of part of it finally, cicatricial contraction occurs in the newly organized tissue. Recurrent hemorrhages are caused by the returning force of the circulation, which, when a patient becomes warm in bed, may be enough to open a vessel not firmly closed.

General Symptoms of Hemorrhage.—1, Face first pale, then blue ; 2, pulse sinks ; 3, temperature sinks ; 4, dizziness ; 5, nausea or vomiting ; 6, eyes dazzled ; 7, noises in ears ; 8, fainting and unconsciousness ; 9, either the patient recovers or gets worse. In the latter event the following set of symptoms are noticed : 1, face waxy ; 2, lips blue ; 3, eyes dull ; 4, body cold ; 5, pulse thready, frequent ; 6, breathing incomplete ; 7, repeated swoonings ; 8, permanent unconsciousness ; 9, twitchings of arms and legs ; then death.

Treatment.—Many cases require great decision, sound anatomical knowledge, and sanguine courage for their proper treatment. Classification of local remedies, seven chief classes, viz. : 1, ligature ; 2, torsion ; 3, acupuncture ; 4, compression ; 5, flexion ; 6, styptics ; 7, position.

Ligature.—Divided into 1, ligature at the bleeding point, and 2, ligature of the artery above the wound, *i.e.*, ligature “in the continuity.” General rule : In case of a vessel being wounded, cut down upon the wounded point, tie the vessel immediately above and below the wound. But in some cases such an operation would involve a deep and large incision, *e.g.*, in hemorrhage from upper part of posterior tibial artery ; and in other cases, the artery is diseased at the spot bleeding. In such cases the artery is often tied in the continuity. Materials used : silk, hemp, catgut. Operation : Instruments required are scalpel, forceps, retractors, director, artery, forceps (occasionally, also, aneurism needle), tenaculum. In tying an artery at the spot wounded, a sufficiently free incision should be made (usually by enlarging the wound which leads down to the artery), and then each end of the bleeding artery should be seized and ligatured if the vessel has been divided completely. But if the vessel has been only punctured, two ligatures must be applied with the aneurism-needle, one above and the other below the wound. Secure the ligature with a reef-knot, pulling each end of the knot tight with the tips of the forefingers pressed against it ; unless catgut be used, one end of the ligature is left hanging out of the wound. To tie the artery in the continuity, see the directions given under the head of ANEURISM. *Pathology ; the Effects of Ligature.*—Internal and middle coats, divided, curl up within external coat, which is merely constricted. Formation of conical plug of fibrin. Inflammatory new formation (*i.e.*, escape of leucocytes from blood-vessels into and around clot and arterial coats, and their organization into fibrous tissue). Tied artery eventually dwindles into fibrous cord.

Torsion.—Bryant's directions are : “The vessel should be drawn out, as in the application of the ligature, and three or more sharp rotations of

the forceps made. In large arteries, such as the femoral, the rotation should be repeated till the sense of resistance has ceased; the ends should not be twisted off. In small arteries the number of rotations is of no importance, and their ends may be twisted off or not, as the surgeon prefers." "When the vessels are atheromatous, or diseased, fewer rotations of the forceps are required, the inner tunics of the vessels being so brittle as to break up at once and incurve." The effects of torsion practically resemble those of the ligature, but the inner coats curl up more in the former case, sometimes forming a regular valve. Though torsion leaves no dead foreign body in the wound like a piece of ligature, yet the bruised end of a twisted artery is less likely to live and form adhesions than the less damaged end of a ligatured artery.

Acupressure has been noticed separately. See ACUPRESSURE.

Compression.—Several forms:—1, Tourniquet; 2, digital; 3, ordinary bandages with or without graduated compress; 4, elastic bandaging. Chief kinds of tourniquet are Petit's and Signorini's; Petit's is most used for operations, and consists of a webbing band, with a pad and a screw for tightening. It is usual to place a small compress, made of a small soft roll of bandage or of lint, over the artery to be compressed. Signorini's tourniquet is used chiefly in the treatment of aneurism, and it consists of two curved metal arms, with a screw-hinge between the two and a pad for the artery at the extremity of one. Lister's tourniquet for the abdominal aorta is on the principle of Signorini's. In applying any tourniquet it is necessary to adjust it with great deliberation and care, otherwise the pad is very liable to slip off the artery. One should mention here the lever used by Davy, with great success, to compress the iliac arteries, *per rectum*. *Digital compression* is preferable in almost every case, 1, because of the liability of all instruments to slip out of place; 2, because the human finger is so delicate, tender, and elastic when compared with a rigid tourniquet or bandage. But it is difficult to obtain for this purpose, and expensive of time and labor. In some cases, *e.g.*, hemorrhage from internal carotid into pharynx, no other form of compression might be applicable. Digital is often supplemented by the compression of a small sand-bag, placed upon the finger, which sand-bag supplies the place of muscular force. *Bandaging*.—In arterial hemorrhage from a limb, if an attempt be made to check it by the bandage and compress, the joints should be flexed and the whole limb bandaged. There is a form of compression called "plugging;" for instance, if a gluteal aneurism were opened freely in mistake for abscess, the proximal end of the artery would very likely be in the pelvis and inaccessible; then the aneurism would have to be stuffed with lint and the pelvis bandaged, *pro tem.*, while further measures were considered or undertaken.

Flexion.—Is closely allied to compression, and should almost always be combined with it. One objection to flexion is the disagreeably constrained

position often unavoidable. To demonstrate the value of flexion, bend the elbow strongly and feel the pulse at the wrist : it will be scarcely perceptible.

Styptics.—1, heat ; 2, cold ; 3, drugs, *e.g.*, iron, tannic acid, gallic acid, catechu, alum, matico, and many others. *Heat.*—The actual cautery is the only form in which the books speak of heat as a styptic ; but, years ago, before commencing the study of medicine, I accidentally observed the power which very warm, that is decidedly hot water (120° to 140° Fahrenheit), has of closing small bleeding vessels. In hemorrhages from mucous membranes, for example, those which Billroth calls “parenchymatous,” I believe hot water to be much more effectual than cold ; so, also, in oozing from wounds. In major amputations it should be preferable because it is less depressing than cold.¹ The actual cautery should be used at a black heat, and held close to, but not touching the bleeding part. It causes an eschar with a suppurating surface beneath. Cold is applied chiefly in the form of ice or ice-water. The most powerful styptic drug is perchloride of iron. The strongest tincture is usually employed, and it is often made to saturate a compress. Thus, styptics, pressure, and flexion can all be combined if desirable. Billroth speaks of turpentine as a most effective but painful and heroic styptic. The above remedies should be supplemented by elevation of the part, general rest, and avoidance of anything likely to excite the patient's circulation. *General Treatment.*—Is indicated for the faintness and weakness caused by hemorrhage. Horizontal posture, ammonia, ether, wine. The application of Esmarch's bandage to a limb has been suggested, to drive more blood into the vital centres (Wharry). Transfusion. See TRANSFUSION.

Secondary Hemorrhage.—Its causes are, 1, defect in the ligature itself ; 2, defect in the manner of tying it ; 3, the ligature's having been applied too near an offset of the artery, so that collateral circulation has prevented the formation of the usual fibrinous plug ; 4, atheroma ; 5, suppuration or sloughing of the wall of the artery (which suppuration or sloughing is sometimes the result of a contusion and sometimes of erysipelas) ; 6, vascular excitement. The approach of secondary hemorrhage is usually insidious, but it is frequently very sudden, and may be fatal even in a few minutes if the artery be large. *Treatment of Secondary Hemorrhage.*—Never delay or temporize in these cases. The first thing to be tried is pressure, and if properly applied it will rarely fail. The mode of application must necessarily vary with the case, only it should always be firm and uniform ; the bandages, unless elastic, should be starched ; the compresses over the bleeding-point should be carefully graduated, and, if the bleeding artery be in a limb, the bandage should cover the whole of the limb. With pressure should be combined perfect rest, elevation, and flexion. To se-

¹ See Practitioner, February, 1879.

cure rest, splints are sometimes useful. For vascular excitement, give vascular sedatives, *e.g.*, tinct. digitalis. *Vide* Treatment of Hemorrhage in general. When these means fail, the choice then lies between ligature of the bleeding vessel at the bleeding-point, ligature of the artery in the continuity, digital pressure, and amputation of the limb. Some cases are adapted for the use of the actual cautery, of styptics, or of acupressure. Ligature of the artery in the continuity is to be deprecated, because it is liable to be followed by gangrene, and is, moreover, far from a certain remedy. Ligature at the bleeding-point is often useless, because the tissues are there so diseased, or it is objectionable because it would involve opening up a large stump nearly healed. Digital pressure is not always readily obtainable. Certain cases are suitable for amputation. These cases are secondary hemorrhage from the main arteries of the lower extremity, when pressure, rest, elevation, flexion, and re-tying at the bleeding-point have failed. In such cases, tying the main artery in the continuity is very liable to be followed by gangrene, and re-tying at the bleeding-point is often impossible from the depth of the wound and the state of the tissues.

Hemorrhoids.—Are essentially varices of the inferior hemorrhoidal veins. Three varieties, viz.: 1, external; 2, internal; 3, intero-external. *Causes.*—(a) Predisposing: everything which congests the portal system or the hemorrhoidal tributaries of that system. Constipation, high living, sedentary habits, liver complaints, indigestion, feeble circulation, inflammatory disease of the rectum or other pelvic or perineal parts, *e.g.*, fistula, pregnancy, relaxing climate. Early manhood and middle age. Uncommon in young women. (b) Exciting causes: various forms of local irritation; fits of intemperance in eating or drinking, dirt, use of rough irritating material for the person, sitting on cold slabs, drastic purgatives. It will be observed that no sharp line separates some of the exciting from some of the predisposing causes. *Pathology.*—All piles at first are merely local congestions or vascular dilatations; but eventually the blood-clots in some part of them, and the connective tissue and vessels contained in them hypertrophy. Usually a small artery lies in the centre. External piles vary greatly in appearance, according as they are swollen or contracted. In the former case they are almost globular and tense; in the latter they may be so shrivelled up as to look like mere folds of thickened skin. Internal piles are classified into 1, longitudinal or fleshy, and 2, globular. The former are usually “blind,” that is, non-bleeding; the latter are bleeding piles. The former are sessile and dusky; the latter are more vascular, and therefore blue or red, and often pedunculated. The relative proportion of arterial, venous, and fibrous material in piles varies greatly. Superficial excoriation and ulceration common. Liability also to inflammation and strangulation. *Symptoms.*—Itching, irritation, and discomfort; then tenesmus, pain in lumbo-sacral region and in testicles; irritability of bladder, disturbed nights, miserable bodily condition, and pinched-up

countenance. When there is hemorrhage to any extent, anæmia, sometimes to the utmost degree, ensues. Hemorrhage often periodical: arterial or venous or capillary, trifling or moderate, or sudden, copious, and most injurious. Mucous or muco-purulent discharge. The latter indicates ulceration. *Complications*.—Fistula, fissure, prolapsus, and the various diseases which are so often the predisposing causes of the piles themselves. *Diagnosis*.—From prolapsus, polypus, and condylomata. *Vide* these diseases and compare symptoms. *Treatment*.—Remove cause, if possible. Some cases obviously require operation; others can plainly be cured by gentler means. In a third class of cases, milder treatment should be tried first, operation afterward, if necessary. General treatment: gentle exercise alternating with rest on a cool hard couch; temperate diet; gentle purgatives: conf. sennæ co., sulphur, cream of tartar, Friedrichshall, Püllna, Hunyadi Janos, etc. Enemata of cold water. Conf. piperis co. Conf. pip. co. should always be combined with or followed by a laxative. Tonics in suitable cases. Blue pill, taraxacum, etc., for the liver. Glycerine in ʒj. doses. When the piles have been cured, but anæmia remains, give mist. ferri co. or pil. ferri co. freely. Local treatment.—I. Non-operative. Cleanliness, but avoid irritating soaps; glycerine soap and warm water; cold water. If piles prolapse at stool, return at once. Astringents: ung. gallæ co., astringent injections. Quantity: two ounces nightly. Strength: tinct. ferri perchlor. ℥. x. to aquæ ʒj. Suppositoria acidi tannici. For *inflamed* piles: foment, poultice, leech the neighborhood of the pile. When a large clot forms in a pile, incise pile and turn out clot. *Suppurating* piles: puncture when mature. *Strangulated* piles: reduced gently. Relieve pain on general surgical principles. II. Operative treatment. External piles are excised; internal are removed by, 1, ligature; 2, cautery; 3, nitric acid. *Excision of External Piles*.—Seize with vulsellum forceps, clamp, snip off with scissors curved on the flat, pass a cautery lightly over stump, unclamp; snip off any pendulous little fold of skin; pad of oiled lint; T-bandage. *Ligature of Internal Piles*.—Let the nurse empty patient's rectum with an enema shortly before operation. Patient should sit over warm water to relax the parts, and make it easier to protrude the piles. He then lies on one side, and draws up his knees. Seize each tumor with pile-forceps, cut through that side of it next skin with scissors, surround base of tumor with a hempen thread, tie the pile very tightly. Cut ends of ligature short, oil well, and push back the ligatured mass within the anus again. Ligature separates in about a week. An anodyne is to be given after the operation, and a laxative on the second day. Anæsthesia often dispensed with. Dress with dry cotton wool. *Cauterization of Internal Piles*.—Preparation same as for ligature. Smith's clamp, ivory side downward, snip off piles with scissors, sear bases with actual or with galvanic cautery. Latter said to cause least after-pain. Unclamp gradually, and cauterize any bleeding point. Suppository of morphia. Usual to

anæsthetise during this operation. After-treatment same as for ligature. Recovery quicker. Danger about the same, but in either case very little. *Nitric acid*.—Suitable for sessile hemorrhoids. Apply with a piece of wood through speculum. Concave clamp to protect healthy mucous membrane. Galvanic cautery applied lightly answers admirably for sessile hemorrhoids.

NOTE.—When operating for hemorrhoids, avoid, as much as possible, damaging the line where the mucous membrane joins the skin. When there is a fissure, operate on it first.

Hand, Deformities of (inclusive of *fingers*).—Four classes, viz.: 1, deficiency, 2; excess, 3; webbed fingers, 4; contractions. It is rare to find a finger or any part of the hand congenitally deficient.

Supernumerary fingers are frequent: one is the common number, and it lies usually on ulnar side of little finger. Thumb may be bifid, or there may be a supernumerary thumb. A finger may be too long or too short. A very rare deformity is a double hand on the same wrist.

Contractions.—Four classes: 1, congenital; 2, paralytic; 3, traumatic or cicatricial; 4, rheumatic.

Congenital contraction assumes the form called "*clubbed hand*," which is analogous to clubbed foot, but very rare.

Rheumatic contraction bends the finger upon the palm and is, practically, the most important deformity of the hand. *Causes*. Either chronic rheumatic diathesis, or the habit of pressing on some round-headed instrument like a chisel or a walking-stick. *Signs*.—One or more fingers, especially the little one, is flexed, a tense subcutaneous fibrous band bridging across from it to the palm. *Pathology*.—Chronic inflammatory thickening and contraction of fibrous tissue between palmar fascia and sheaths of flexor tendons.

Treatment.—Supernumerary fingers should be amputated, as their proximal joint sometimes communicates with one of the normal metacarpophalangeal articulations. In such a case the base of the supernumerary finger may be left. If the operation is done at an early age, this stump will not grow.

Clubbed hand can only be treated on the same principles as clubbed foot, but with not nearly the same hope of success.

Treat rheumatic contractions in this way: Divide, subcutaneously if possible, or else antiseptically, the contracted fibrous bands, carefully avoiding any injury to sheaths of tendons. Then extend fingers on a splint. Attend to the cause. See Adams's little book on this subject.

Webbed fingers, unless ingeniously treated, reunite after being cut apart. **Method 1.**—Pass a metal ring through the base of the web and keep it there till the aperture cicatrizes. Then complete the separation. **Method 2.**—Wrap a flap of skin taken from the back of one finger over the raw surface of the other finger, and another flap of skin taken from the palmar

surface of the latter finger over the raw surface of the former, utilizing, of course, the skin of the web itself. Method 3 (*vide* Barwell, *Medical Press and Circular*, 1866, or Holmes's "System," v., 825).—In this, skin is taken from the buttock. Method 4.—Gradual strangulation of the web by a clamp.

Hanging. See ASPHYXIA.

Hare-lip.—*Causes and Pathology.*—Congenital. Many degrees of this deformity. Single hare-lip and double hare-lip. The fissure is not central, but corresponds, in single hare-lip to one side, and in double hare-lip to both sides, of the intermaxillary bones. The intermaxillary are the bones which form the front of the hard palate and alveoli carrying upper incisor teeth. Hare-lips vary in depth from a mere notch in the edge of the upper lip to a total lateral separation of the intermaxillary bones. The deformity in hare-lip is homologous to a fissure which is normal in some fishes, but it has no homology with the cleft in the lip of the hare. It often coexists with cleft-palate. Male sex predisposes. Double hare-lip almost always affects boys, and is ten times less common than the single variety. The intermaxillary bones in double hare-lip often project forward from the end of the nose, and are frequently only half-developed in size. *Treatment.*—Operative only. Best time, third to fifth month of infancy. Contraindicated during dentition or ill-health. Plastic operations fail in syphilis (Verneuil). Chloroform unnecessary, and difficult to administer. If desired, anæsthetic vapor may be pumped through a catheter. Child in a lying or sitting position on a table or on nurse's or surgeon's lap. Secure his limbs by rolling him up lightly but firmly in a towel. Assistant to check hemorrhage by holding each side of the upper lip between his finger and thumb. Surgeon sponges for himself, or lip may be secured in T. Smith's forceps. Begin by separating, with the knife, the two sides of the lip from the jaw subjacent, unless the former structures be already very free. Then pare the edges of the cleft. Remove enough, especially from the apex of the cleft and from the junction of the cleft with the edge of the lip. Then suture, strap, and put on Hainsby's truss. The incisions are best made with a view to utilizing the "parings" of the fissures. *Vide* diagrams in text-books. In double hare-lip the whole margin of the intermaxillary nodule is pared. When this nodule projects it must, unless it is rudimentary, be broken at the base and bent back to the level of the lip. If it is rudimentary it may be removed altogether, except the skin which covers it anteriorly. This must be stitched back, either to complete the nasal septum if that is deficient, or, otherwise, to fill the gap in the lip. *Modes of Suture.*—1. The "hare-lip" suture proper. Two pins. Enter and exit one-fourth inch from fissure, pass deeply, nearly reaching mucous membrane. Lower one secures coronary artery. Twisted suture. Interrupted wire suture at red border of lip. Sharp ends of pins nipped off. Pieces of lint placed beneath ends of pins. Strapping, broad

at ends and narrow in middle, brought across lip. 2. The common interrupted wire suture. This answers well for ordinary cases and is less likely to leave scars. All pins should be removed on third day very gently, the lip being well supported at the time and strapped immediately afterward. Act of suckling, rather beneficial than otherwise, as it tends to close the fissure. In order to bend back the intermaxillary bone when it projects, instead of breaking its base it is a better plan to cut a V-shaped piece out of the septum nasi.

Head, Injuries of the.—Important, because almost all varieties are liable to be complicated with cerebral mischief. *Classification* is primarily anatomical. 1, Scalp injuries; 2, fractures of skull; 3, injuries of brain and its membranes; 4, injuries of cranial nerves.

I. Scalp may be contused or wounded, or both. **CONTUSIONS OF SCALP.**—Very common. Extravasation may be diffused or circumscribed. Circumscribed extravasation occurs either, 1, above cranial aponeurosis; 2, just beneath it; or 3, between epicranium and bone. A special kind of scalp extravasation is *Cephalhæmatoma*, which lies mostly just beneath epicranial aponeurosis and very rarely beneath epicranium. *Signs.*—Fluctuation, hard and thickened margin, soft centre, rarely any discoloration. *Cephalhæmatoma* occurs in the newly born, and is *caused* by pressure of maternal passages or of obstetric forceps. Its usual situation is over the parietal bone. *Fluid Contents.*—Blood with its corpuscles more or less disintegrated, its coloring matter more or less diffused and perhaps partly crystallized, while its plasma is often partly coagulated. The coagulation may entangle the coloring matter and leave the fluid contents pale and yellow. *Diagnosis.*—From fracture. The hardened margin of an extravasation can usually be deeply pitted by steady and continued pressure. See *Fracture*. *Treatment.*—Cold and pressure. Afterward discutient lotions (lotio ammonii chloridi, etc.). Only the most obstinate cases should be aspirated or punctured by a small knife. After puncture apply antiseptic dressings. When suppuration occurs, open freely and poultice. *Scalp, Wounds of.*—Often contused and lacerated. *Prognosis.*—Very good even in the most severe cases, because the vessels of the scalp lie chiefly superficial to the aponeurosis. But, for the same reason, the blood-supply of the cranium is sufficiently interrupted in extensive lacerations to cause danger of necrosis with its consequences. Other dangers in scalp-wounds are erysipelas, and accumulation of pus, causing puffy swelling. *Treatment.*—Clean carefully and replace flaps accurately. Use sutures, if necessary, but do not pass them through the aponeurosis. Experience of American Civil War was in favor of sutures ("Medical and Surgical History War of Rebellion"). Dressing should be just enough to support and protect from draughts of cold air, without heating. Bleeding vessels can sometimes be conveniently secured between a needle and twisted suture. Treat complications on general principles, giving free exit for pus, etc.

II. FRACTURES OF SKULL.—Classified in three ways: Firstly, into simple and compound; secondly, into fractures of the vault and fracture of the base; thirdly, according to the physical characters of the fracture, into fissures, starred, depressed, punctured, elevated, and comminuted fractures. It should also be noted, when possible, what is the relative amount of damage done to the inner and outer tables of the skull. *Causes*.—Blows and falls on the head, and, though very rarely, indirect violence, viz.: falls on the feet or blows on the lower jaw. The nature of the fracture naturally depends greatly on the cause. See pathology following. *Anatomy and Pathology*.—Position of fracture. This depends chiefly on the point where the causative force has been applied, and on nature of force. Sharp instruments cause depressed fractures at the point of contact. Sometimes they only crack the outer table, while they depress the inner. Heavy, softish bodies, *e.g.*, a bale of cotton, are likely to cause fractures of the base. The skull has been divided into three “zones,” and evidence given to show that a blow on the vault of one zone is likely to cause a fracture of the base of the same zone. The middle zone consists of “the parietals, the squamous, and the anterior surface of the petrous portions of the temporal, with the greater part of the basisphenoid.” The posterior and anterior zones include the rest of the skull. The middle zone is the commonest seat of fracture. Shape of fractures (*vide* classification). A very common shape is a depression with three triangular sides sloping downward till their apices meet in the centre of the depression. In fractures of the base, sutures—*e.g.*, the petroso-occipital—are sometimes torn open. Most fractures of the base are continuations of fissures of some part of the vault. But a few appear to be genuine cases of *contre-coup*. This is what is meant by *contre-coup*: Suppose a watch lying with its face toward the table, and a weight to fall upon the back of the watch. If the glass cracked, that would be a fracture by *contre-coup*. In some of these cases, the base of the skull is said to be broken by concussion with the atlas. One table is usually more damaged than the other, and the least damaged lies toward the surface where the violence has been applied, therefore the most damaged is almost always the inner table. Extravasations within the cranium, damage to internal and middle ears, and to cerebral centres and nerves, as well as membranes of brain, very common. *Signs and Diagnosis*.—Obvious in compound fractures with depression. In compound fractures without depression fissure looks like a red line. One of the sutures must not be mistaken for a fissure. Simple fractures without depression can only be recognized or suspected indirectly through their complications. Simple fractures with depression have to be distinguished from contusions with thick, hard margins. The depression in fracture is generally more abrupt at one part of its margin than another, while the hard margin of a contusion is usually tolerably circular and uniform, as well as impressionable by steady pressure with

the finger. Fractures of frontal sinuses, or of mastoid cells, often cause emphysema. *Signs of Fracture of the Base of the Skull.*—Bleeding from ear, nose, or mouth, escape of cerebro-spinal fluid from the ear,¹ sub-conjunctival ecchymosis, paralysis of cranial nerves, especially of the seventh pair. Tenderness of mastoid process and ecchymosis in sub-occipital region indicate fracture of posterior fossa, unless direct violence has been applied to the tender and bruised parts. The anatomical explanation of the above symptoms is obvious. Hemorrhage from the ear is the commonest of them. A somewhat rare symptom of fractured skull is escape of brain-matter. Cerebro-spinal fluid is very watery, saline, and contains only a trace of albumen, and the faintest trace of sugar. When such a fluid escapes from the ear directly after an injury, it is pathognomonic of fracture of the base. Amount of fluid sometimes very considerable.² In diagnosing fracture of the skull, always consider the brain-symptoms, if such are present, and consider also the nature of the force which caused the accident. Serious and long-continued cerebral symptoms following a heavy blow on the head are usually caused by fracture and its complications. *Prognosis.*—Depends usually altogether upon the amount of injury done to the brain. In estimating this, consider the cause, the situation, and the shape of the fracture, the age, habits, and health of the patient. The injury done by sharp instruments is generally local and pretty manifest to the surgeon's senses. Heavy, blunt, soft bodies are apt to severely concuss and contuse the brain and fracture the base of the skull, while causing very little superficial damage. Fractures of the base are usually, but not always, fatal. Fractures with escape of brain-matter have been recovered from. Fracture at root of nose may only affect anterior wall of frontal sinus. Young children have no frontal sinus. Depressed, and especially punctured fractures very liable to wound dura mater and brain. Kidney disease makes wounds in this, as in other regions, very serious. *Treatment.*—In all cases, rest, coolness, low diet, high, hard pillows beneath head. Ice locally, a purgative at commencement. Vigorous antiphlogistic treatment *the moment signs of inflammation appear.* Leeches. Cold douche. Continue observation of simple cases at least a month. Remove loose, depressed pieces in comminuted fracture. *Indications for Trephining.*—They are simply the occurrence and persistence, in spite of treatment, of symptoms of local intracranial suppuration, or hemorrhage, or of cerebral irritation, after a blow on the skull. Trephining is contraindicated in cases of dif-

¹ In rare cases, cerebro-spinal fluid has been known to flow from nose or from a fracture of the vertex.

² E. W. Collins (Dublin Medical Journal, February, 1877) demonstrates that 1, sugar is not constant in the fluid; 2, when present, though reacting to Trommer's, Moore's, and Böttgen's tests, it usually does not deflect polarized light, or ferment with yeast; 3, three *constant* characters of cerebro-spinal fluid are 1, very low specific gravity, 2, almost complete absence of albumen, 3, comparatively large proportion of sodium chloride.

fused injury to the brain, and even in cases of depressed fracture unattended by cerebral symptoms (*vide* Gamgee, in *British Medical Journal*, 1877). Bryant is "almost tempted to believe that depressed bone by itself never gives rise to marked symptoms of compression, and that when these are present hemorrhage exists with it." When there is a depressed fracture, it is right to trephine as soon as ever cerebral symptoms appear. Otherwise, ice-bags, leeches, etc., should have a fair trial first. When there is comminution, depressed pieces can sometimes be raised by the elevator or forceps only. See article TREPHINING. Further points are touched upon in the next section, which is about—

III. INJURIES OF THE BRAIN AND ITS MEMBRANES.—These include extravasations of blood within the cranium, contusion and laceration, inflammation and suppuration of traumatic origin, hernia cerebri; and here also must be noticed the conditions styled "concussion" and "compression."

Extravasations of Blood within the Cranium.—1, Between dura mater and bone; 2, in cavity of arachnoid; 3, on the surface of the brain between it and the arachnoid; 4, in the substance of the brain or in its ventricles. 1. Extravasation between dura mater and bone. *Causes.*—Wounded blood-vessel, usually a branch of middle meningeal artery, sometimes a wounded sinus, especially the lateral sinus. *Pathology.*—The effused blood forms a clot, often of enormous size and having very little tendency either to be absorbed or to become encysted. This clot, when large, causes a corresponding depression on the surface of the brain. *Signs.*—May be *nil* if clot be small, or even in the case of a large hemorrhage, if it be poured out so gradually that "the brain has time to accommodate itself to the pressure." When symptoms are present they are those of compression or of irritation. The most valuable evidence of extravasation exists when symptoms of compression come on, not immediately after an injury, but after an interval of consciousness. For prognosis, treatment, etc., see paragraphs about *Compression*. It is to be noted that irritation of the nerves of the dura mater causes reflex convulsions and contractures of the same side of the body as the injury to the head. 2. Extravasation in cavity of arachnoid. Very common. *Pathology.*—When not absorbed, has a tendency to form blood-cysts contained in a new fibrous membrane which is attached to the parietal layer of the arachnoid, and makes a depression on the surface of the brain. *Signs and Diagnosis.*—Cannot be distinguished from other intra-cranial hemorrhages. Long after the original injury, it is liable to cause headaches and mental irritability. *Treatment, etc., see Compression and Cerebral Irritation.* 3. Extravasation on surface of brain, beneath visceral arachnoid. Accompanies general cerebral injuries. Never encysted. May spread very widely. No special signs. No special treatment. 4. Extravasations into substance of brain or into its ventricles. Not to be distinguished from apoplexy except by the history. *Treatment, etc., as in Apoplexy.*

Contusion and Laceration of Brain.—*Pathological Anatomy.*—Minute extravasations, sometimes few, sometimes numerous, sometimes occupying only a limited portion of gray matter, sometimes diffused through greater part of brain ; sometimes attended with very little injury to cerebral substance, sometimes followed by complete softening and disintegration, or, after a longer interval of time, by atrophy of brain-substance. Situation often opposite the part of cranium struck (*contre-coup*). Usually middle or anterior fossa of base. Lacerations are often complicated with large extravasations. *Symptoms.*—Partial spasms and paralysis, occasionally coma. Frequently concussion. None of these symptoms belong specially to cerebral contusion and laceration, which are so difficult to diagnose satisfactorily that their *treatment, etc.*, will best be considered under the heads of concussion, compression, cerebral inflammation, irritation, etc.

Encephalitis, Traumatic.—This includes meningitis, for, during life, inflammation of the membranes cannot be diagnosed from that of the brain-substance ; though a shrewd guess may sometimes be formed by considering the exciting cause. Classified into : 1, acute, and 2, subacute or chronic. *Causes.*—All injuries of the head. For even a scalp wound may excite firstly, osteitis, and secondarily, meningitis and cerebritis. Neglect of rest and of temperance after head injuries is very likely to excite inflammation. *Pathology.*—Congestion of the parts inflamed. Firstly, yellowish lymph and then pus appears on the inflamed membranes. Cerebral substance may soften and break down. Serous effusion into ventricles. When the exciting injury is not very deep, *e.g.*, most punctured fractures, the membranes are chiefly affected ; but when it is general or deep, *e.g.*, contusion of brain, the cerebral substance may be the chief seat of inflammation. Although the appearances are most marked at the actual seat of injury, yet traumatic encephalitis generally spreads to a great part of the brain and its membranes. In chronic cases, parietal and visceral layers of arachnoid cohere. The amount of cerebral congestion is estimated *post mortem* by the number and size of the red points visible on section of the hemispheres. This test is not satisfactory, for it is influenced by the relative fluidity of the blood and the pressure of serous effusion in the ventricles. *Signs.*—1, Acute. Severe pain in head, over-sensitiveness to light and sound, noises in ears, one or both pupils contracted, partial spasms and paralyses, epileptiform convulsions, usually, or at all events at first, unilateral ; fever, pulse frequent, or variable, temperature raised slightly at first, and raised more if suppuration come on. Vomiting. Delirium. Lastly, coma, and death by exhaustion and compression. The relative prominence of the symptoms catalogued above varies greatly in different cases. In comatose stage pupils eventually dilate. 2. Chronic.—When it comes on long after receipt of injury, there may be premonitory signs, *e.g.*, irritable temper, headaches, etc. The symptoms differ only from those of acute inflammation in being less concentrated and severe.

Diagnosis.—Traumatic intra-cranial inflammation can scarcely be confounded with any other disease if its causes and signs are carefully considered. *Prognosis.*—Very serious, especially if not treated promptly and boldly. *Treatment.*—Cold locally, purging, calomel, venesection, leeching, morphia. Venesection rarely used now. Leeching over temples and mastoid processes very beneficial. But local cold is the most powerful remedy. The cold douche is the most effective form, and it should be used courageously and perseveringly. Ice-bags. Purging is highly praised. Calomel and butter placed on tongue. Small doses of calomel and morphia sometimes given, especially when furious delirium comes on a few days after a head-injury. Dark room, head raised on high hard pillows, hair cut short. For treatment when suppuration supervenes see following paragraph. Probably many cerebral inflammations which have resulted from wounds would have been prevented by antiseptic dressings.

Intracranial Suppuration.—Within the skull, as elsewhere, suppuration is one of the “terminations” of inflammation; it is practically very important whether the pus be between the skull and dura mater, just beneath the dura mater, or within the brain substance. *Signs.*—Not decisive. Symptoms of compression gradually coming on during encephalitis and accompanied by further rise of temperature, and rigors. At the same time a coexistent scalp wound may become pale and dry, or Pott's puffy swelling may form. If the wound be deep enough, the bone may perhaps be seen exposed by separation of pericranium. When these local signs are present, it is not unlikely that the pus is lying just beneath that part of the skull. *Prognosis* very bad; to make it worse, pyæmia is a not unfrequent complication. *Treatment.*—The main question is that of trephining. Difficulty of treatment consequent on difficulty of diagnosis. When above symptoms are well-marked, trephining is clearly indicated. Then, if brain is not found pulsating beneath exposed dura mater, that membrane may be punctured. The knife has been plunged bodily into the brain itself, not without success. Operate antiseptically.

HERNIA CEREBRI.—*Causes.*—Wound of skull and dura mater, followed by inflammation of part of brain immediately beneath it. More common in children, and when aperture in skull is small than when it is large. *Pathology.*—Inflammatory proliferation of connective tissue of brain, leading to a hernia of a substance whose structure is sometimes entirely like that of granulation-tissue, brain-substance, and clotted blood, and sometimes of blood-clot only. *Signs.*—Hernia usually appears a few days after injury, but may appear much later. Brown, or reddish-brown mass, pulsating synchronously with respiration, and increasing in size. Brain symptoms, sometimes very slight at first, are those of cerebral irritation and inflammation. In fatal cases, death ensues from the encephalitis. *Prognosis* bad. *Diagnosis.*—From fungus of dura mater and fungus of cranium. Former appears gradually, and is preceded by no fracture from external

violence, latter does not pulsate. *Treatment*.—Protective and slightly compressive. Shaving off is contraindicated. A hollow metal cap fitting accurately. Any ordinary dressing, combined with compression by a soft pad and bandage.

COMPRESSION AND CONCUSSION OF BRAIN.—"Compression" and "Concussion," two terms which represent each a peculiar and important assemblage of symptoms, rather than a definite pathological state. Persons suffering from concussion are, in common parlance, said to be stunned. Compression means a more alarming condition, in which the patient cannot be aroused from stupor, and lies wholly or partially paralyzed. The presence or absence of paralysis has been given as the distinguishing mark between the two states. Still there are cases which partake so of the nature of both, that no one would class them under either head, except persons endowed with exceptional decision of character and indifference to both detail and accuracy. The origin of the terms should always be borne in mind: "concussion," of course, means "shaking" or "striking," and "compression" implies the pressure of something, *e.g.*, blood, or pus, or bone, or serum, on the brain.

Compression.—Pathology.—Depressed fracture of skull, extravasated blood within the cranium, inflammatory thickening or œdema of the brain, or pus within the cranium are found, besides in each case various conditions such as are sketched in the above notices of contusion, intracranial hemorrhage, inflammation, etc. Symptoms of Compression and Concussion contrasted :

COMPRESSION.

1. Total insensibility.
2. Respiration stertorous, slow, and puffing.
3. Pulse full, slow, labored.
4. Special senses paralyzed.
5. Pupils widely dilated, or, sometimes one dilated and the other normal or contracted.
6. Stomach insensitive.
7. Sphincters may be paralyzed, but bowels are torpid.
8. Bladder paralyzed. Consequent retention of urine.
9. Does not usually appear at moment of injury, but afterward, and tends to get worse.

CONCUSSION.

1. Insensibility, from which patient can usually be partly aroused.
2. Respiration feeble, like that of a person in a faint condition.
3. Pulse weak, irregular, and often frequent.
4. Special senses dulled.
5. Pupils variable but usually sensitive to light.
6. Nausea as recovery is taking place.
7. Bowels relaxed, but sphincters not paralyzed.
8. Bladder can expel water.
9. Comes on instantaneously and passes off gradually.

Concussion.—Pathology.—No thoroughly satisfactory evidence of concussion's occurring without some bruising or laceration of the brain.

Symptoms.—See table contrasting them with those of compression. *Terminations.*—Recovery may be, and usually is, perfect; or there remain headaches, mental irritability, affections of the senses, weakness, impaired virility, epilepsy. Concussion frequently passes into compression. See CONTUSION AND LACERATION OF BRAIN (p. 121). *Treatment.*—At first, warmth, hot blankets, hot bottles, friction, and other gentle remedies for shock. Alcohol contraindicated. And it should always be borne in mind that concussion is not usually in itself dangerous, but that it is quite possible by too vigorous and too stimulating a treatment to bring on hemorrhage or inflammation. When reaction has taken place, if not before, precautionary measures against hemorrhage, inflammation, etc., should at once be adopted. See Precautionary Treatment of Fractures of Skull.

Treatment of Compression varies with the suspected or known cause, whether extravasated blood, or depressed fracture, or inflammation, or suppuration, or foreign body. But always attend to these points—1, dark room; 2, head high; 3, head shaved; 4, head cool; 5, low diet; 6, see that the bowels act freely, if necessary, placing a drop of croton oil in a little sugar on the tongue. The treatments of inflammation and suppuration are given above. The question of trephining for compression has been answered in the affirmative or the negative, according as the intracranial mischief is believed to be local and accessible or to be general. But I am inclined to hold that the introduction of the antiseptic treatment reopens this question, and that antiseptic trephining may be justifiable to relieve general intracranial tension.¹ I must again also call attention to the power of the cold douche long continued, *e.g.*, for hours, over intracranial inflammations.

Cerebral Irritation.—*Pathology.*—Probably laceration of brain. *Symptoms.*²—Graphically described in Erichsen—1, bodily; 2, mental. Bodily: attitude of general flexion—knees drawn up, elbows bent, etc.; restlessness; eyelids firmly closed; no heat of head; pulse weak and not frequent; rarely retention. Mental: irritable temper, desire to be let alone; muttering, frowning, grinding of teeth if disturbed. When these symptoms subside, the mind is left for a long time weak and fatuous. *Treatment.*—On general principles; rest, darkness, quiet, coolness, ice-bag, patience. Chloral and even morphia may be given in some cases; but their effects should be keenly and cautiously watched.

IV. INJURIES OF CRANIAL NERVES.—*Causes.*—Fractures of bones of skull, extravasated blood, inflammatory effusion. *Signs.*—May be deduced from consideration of functions of these nerves. Paralysis in most cases, spasms in some. Disturbed nutrition of cornea and conjunctiva when fifth nerve

¹ See Yeo, British Medical Journal, May 14, 1881.

² Not unlikely that the peculiarity of this set of symptoms is due rather to the part injured than to the kind of injury.

is injured. *Prognosis*.—Usually unfavorable; but when the paralysis or spasms come on during attacks of intracranial inflammation, recovery may take place on absorption of inflammatory effusion. *Treatment*.—If possible remove the cause. Nerves most frequently affected are seventh and second pairs. To complete these notes on injuries of the head, we must notice traumatic osteitis of the cranial bones, which when acute is usually called “inflammation of the diploë.” Chronic osteitis of cranium follows any injury (of course it is sometimes syphilitic); it may result in hypertrophy, caries, or necrosis. Acute inflammation of cranium is very dangerous from its liability to spread to membranes of brain.

Heart, Injuries of. See INJURIES OF CHEST.

Hernia.—This word, which probably is derived from Greek *ernos*, a shoot, is applied to the projection of a viscus through the wall of any of the body-cavities, *e.g.*, hernia cerebri, hernia of lung; and, by extension, it is given even to such phenomena as bulging of tunica intima of an artery through an opening in the media and adventitia. But “hernia” used without qualification refers only to hernia abdominalis. *Causes*.—Predisposing: 1. Sex, four times as often in males as in females. 2. Age, most hernias develop before age of 35. 3. Occupation, habit of making violent efforts. 4. Hereditary conformation, including patent tunica vaginalis funiculi, abnormal laxity of mesentery, congenital defects of abdominal walls. 5. General weakness of the system. 6. Excessive obesity and flabbiness. 7. Pregnancy. 8. Defects in abdominal wall of traumatic origin, cicatrices, etc. Observe that number 4 includes three causes. Cause 6 acts strongly if obesity rapidly diminishes. *Exciting Causes*.—Sometimes a strain, or violent efforts often repeated. Cough. In male infants, the application of a truss to an umbilical hernia may result in the production of an inguinal hernia. *Symptoms*.—In earliest stage, merely “weakness” locally, with slight fulness in erect position and impulse on coughing. Then a soft, round or oblong tumor develops, reducible generally with a gurgling noise. If containing omentum it is called “*epiplocele*,” and may be hard and lobulated. Herniæ are opaque, and dull on gentle percussion. Mode of appearance and growth, usually sudden in “congenital” hernia, gradual in other forms. A hernia passes by a broad neck into the abdomen. Subjective signs are dragging pains and dyspeptic feelings. Herniæ are often irreducible. *Anatomy*.—A hernia consists of (1) contents, (2) sac, (3) coverings. Contents: intestine, omentum, or, more rarely, one of the other abdominal or pelvic viscera, *e.g.*, ovary, stomach, gall-bladder. Fluid between sac and contents, variable in quantity. An “enterocele” contains bowel only, an “epiplocele” omentum only, an “entero-epiplocele” both. Sac is continuous with peritoneum. It is identical with tunica vaginalis in “congenital” hernia; but, in other cases, is formed by gradual pushing out of a pouch of peritoneum. It consists of a mouth, neck, body, and fundus. Mouth and neck are originally puck-

ered ; but, with time, this puckering obliterates, and, still later, the neck and mouth are apt to thicken and contract. Hence many cases of strangulation. If a hernia be reduced before its sac has had time to grow old, thickened, and adherent, the sac will be drawn up into the general peritoneal lining of the abdomen again. *Diagnosis*.—See special varieties of hernia, especially inguinal and femoral. *Prognosis*.—In spite of the regular use of trusses, hernia usually persists throughout life. Fair prospect of recovery in umbilical hernia of male infants, and in slight inguinal herniæ promptly, patiently, and persistently treated. Congenital herniæ are most liable to strangulation, irreducible herniæ to obstruction. Umbilical herniæ of women may attain enormous size, especially in fat, flabby women. So also may other herniæ, if neglected. *Treatment*.—Palliative, that is the *truss*. Common truss, single or double, inguinal or femoral ; Salmon & Ody's ; mocmain ; various pads, Wood's horse shoe pad, circular pyriform and oval pads, water-pads, air-pads. Bag-trusses for irreducible hernia. Spring of common truss encircles pelvis just below crest and anterior superior spines of ilium. Salmon & Ody's has a ball-and-socket joint, with a spring going half round body on side opposite to rupture. Mocmain has a soft belt with a lever spring near the pad. Wood directs pad to be flat, saying that rounded pads tend to dilate hernial apertures. For umbilical hernia, pads with belts, corks, strapping, etc. See UMBILICAL HERNIA.

Points to be noted in fitting a truss : 1, side of hernia (right or left) ; 2, size of projection ; 3, size of hernial aperture ; 4, kind of hernia (inguinal or femoral). Measurements : 1, girth of body midway between great trochanter and anterior superior spine of ilium ; 2, distance between anterior superior spine and hernial aperture ; 3, direction in which pressure should be made. In fat, large-bellied people this is usually upward and backward, in thin people it may be simply backward. The pressure of the spring should be adjusted carefully. Infants should have two trusses, that one may be worn while the other is being cleaned. Mocmain truss probably most comfortable, but has very little strength. Persons who have to make great efforts occasionally should have an extra strong truss for such times.

Radical Cure of Hernia, Operative Treatment.—See Wood on Rupture, or some large treatise on surgery. The operation is done only for inguinal hernia.

Complications of Hernia, three primary ones, viz. : 1, obstruction ; 2, strangulation ; 3, inflammation. Gangrene and ulceration are secondary to one of these primary complications.

Obstructed Hernia.—In this condition the impediment to the transit of *feces* lies within the bowel, not external to it as in strangulation. But the symptoms differ from those of strangulation chiefly in degree. When obstruction is complicated with inflammation, diagnosis from strangulation is very difficult. Umbilical herniæ are the favorite seats of obstruction.

Pain, flatulence of tumor, increased tension and size of tumor ; on manipulation, gurgling may be produced and solid fecal matter felt. Feverishness, nausea, vomiting. *Treatment*.—Poultices and aperient enemata. Gentle purgations before vomiting occurs.

When an irreducible hernia is obstructed, it is sometimes called an “*incarcerated hernia*.”

Strangulated Hernia.—The herniated parts are so compressed at or near neck of sac that the circulation of blood through their vessels and of fecal matter through herniated intestine is obstructed. *Predisposing Causes*.—Disordered or relaxed state of health. Sudden formation and descent of a congenital hernia. Working without having the prudence to keep up a hernia by a truss. *Symptoms*.—Local: pain, tenderness, swelling, usually increased tension, uneasy feeling in hypogastrium, dragging sensations from neighborhood of rupture. General: nausea, anorexia, vomiting, constipation, tenesmus ; feverishness, flushed cheeks, frequent pulse, furred tongue. Then vomiting gets worse, local tenderness increases, peritonitis comes on, patient collapses and dies. The vomiting is rarely absent. It is of a characteristic nature. Large quantities of fluid are thrown out of the mouth with a sudden gush. This fluid at first comes from stomach, then intestines, it is then called “fecal,” sometimes “stercoraceous.” Constipation is complete. *Pathology*.—Constriction of hernial tumor at point of strangulation, so that when the bowel is liberated a distinct groove still remains, marking the line of stricture. Changes which take place in strangulated bowel or omentum are, 1, congestion and swelling ; 2, inflammation ; 3, gangrene. The signs of these three stages will be given in describing the operation of herniotomy ; as it is most important to bear them in mind during that operation. The fluid in the sac will be described at the same time. *Diagnosis*.—Generally easy. But, if the general symptoms of intestinal obstruction coexist with any tumor in one of the recognized seats of hernia, unless that tumor is known positively not to be a hernia, and unless the case is yielding to other treatment, the surgeon should cut down upon the tumor. Very little harm can result from the procedure. Strangulation is sometimes difficult to distinguish from mere obstruction with inflammation. In the latter case there is less vomiting, always great local tenderness, and, instead of absolute constipation, the occasional passage of flatus and liquid. It is to be borne in mind that peritonitis may complicate without being caused by a hernia. *Treatment*.—1, Taxis ; 2, warm bath ; 3, opium ; 4, rest in warm bed ; 5, anæsthesia ; 6, herniotomy. Although numbers 2, 3 and 4 are usually described as auxiliary to the taxis, I put them separately for two reasons, viz.: 1, that they are in a few cases perfectly competent to reduce the hernia without the assistance of the taxis ; 2, that they are much underrated now-a-days in consequence of the reaction against that sad mistake which has allowed so many cases to pass beyond hope before

operation, and in consequence of the notion that these minor remedies act only by relaxing the constricting bands; whereas they may act directly on the strangulated parts themselves by reducing the congestion and consequently the size of the strangulated intestine. Some amount of circulation must usually exist during the first stages of strangulation, or the intestine would not live as long as it does. In every case, firstly make a short and gentle application of the taxis. Secondly, give 20 minims of laudanum, then a warm bath for a time proportional to patient's strength, and then place him in bed between blankets.

Still keeping the patient warm in blankets, anæsthetise him, and try the taxis gently again. If it fail this time, operate at once. The *taxis*. Position of patient, supine with his legs drawn up. Bear in mind resisting forces, viz.: 1, tightness of constricting ring or band, 2, swelling of strangulated viscus. Manipulate hernia as nearly as possible into a line with the axis of the ring which constricts it. Then compress it gently but steadily and completely with the hands or with the fingers for a long time. This may lessen its bulk. By-and-by, still keeping up this compression with one hand, attempt with the fingers and thumb of the other to manipulate the neck of the hernial tumor back into the abdomen. It is said that in very thin persons assistance may be derived from insinuating the finger end or nail beneath one edge of the constricting ring and pulling it outward. When reduction takes place, bowel goes back suddenly with a gurgle. Warm bath, average time twenty minutes. Laudanum, dose twenty minims. Anæsthesia not only makes patient insensible to pain of proceedings, but destroys any muscular resistance that he might otherwise make. Practice of inverting patient during performance of taxis. Aspiration of hernial tumor before taxis.

Herniotomy.—Usually classed as 1, herniotomy without opening sac; 2, herniotomy with opening sac. Both operations identical up to a certain point. Scalpel, forceps, director, artery forceps, ligatures, retractors, hernia director, hernia knife; strong ligature to tie omentum. Empty bladder, shave, line of incision two to three inches long over neck of sac. Observe the position of certain anatomical landmarks, *e.g.*, spine of pubes, Poupart's ligament, femoral artery. Skin may be divided by pinching up and transfixing. Divide fascia, fat, and cellular tissue on director, layer by layer down to sac. Before opening sac, feel for any constricting bands external to sac and divide them if possible. If strangulation cannot be relieved thus, proceed to open sac by pinching up a small part of it with forceps and cutting it with knife held flatwise. Complete opening of sac on a director. *How to Distinguish Sac from Intestine*.—The sac is a transparent membrane without the special marks possessed by intestine, such as arborescent arrangement of vessels, smooth, glittering surface, etc. It is also thinner than intestine. The opening of the sac is almost always recognized by the sudden escape of fluid. *Division of Stricture*.—Use left

index finger as a director, insinuate finger-nail under stricture, pass hernia knife flat, along palmar surface of finger, through stricture, then turn its edge upward and slightly inward and cut one-eighth to one-quarter of an inch, *i.e.*, a mere notch, no more. *Reduction* of the hernia is then effected by manipulation like that of the taxis. If necessary the knife must be re-introduced and the constricting band notched again. But there are certain conditions under which it is not right to reduce the hernia after dividing the stricture. It follows, of course, that when indications of these conditions are present no attempt should be made to reduce a hernia without opening the sac to see the actual state of things. *Gangrenous bowel*, *bowel manifestly ulcerated* at the seat of stricture, and *omentum inflamed* or bruised should not be returned into the abdomen. In the former two cases an artificial anus will form. In the case of inflamed omentum its return would probably set up general peritonitis; therefore the practice is to tie a stout ligature round its neck and cut the omentum off, merely leaving the neck or stump of it to block up the hernial ring. Slight wounds of the bowel do not contraindicate its reduction. The sides of a puncture can be pinched up and ligatured. A larger wound would require the glover's suture. *Characters of the Serum in the Sac*.—1. Within a few hours, it is pale yellow and clear. 2. After many hours, it becomes dark brown, but clear. 3. When intestine is more inflamed, œdematous, and leathery, the fluid is turbid and coffee-like. 4. As gangrene approaches, blood-clots, lymph-flakes, and pus mix with the fluid. 5. When intestine gives way, fæces and gas escape. *Characters of the Intestine at Different Stages of Strangulation*.—First stage. Congestion, various degrees from mere swelling and redness up to purple color with patches of extravasation, causing a mottled look. Second stage. Inflammation, same appearances as those of first stage; but surface is dull and perhaps adherent, being covered wholly or partially with lymph. Third stage. Gangrene; more adhesive; surface duller; color black or ashy; sloughing and perforation about to occur.

Artificial anus results when herniated bowel sloughs or is deliberately and freely opened by surgeon. Possibility of former event happening even a week after reduction of hernia. Then adhesions prevent intraperitoneal extravasation. *Pathology*.—Two openings, one into intestine above, other into intestine below. Former tends to enlarge, latter to diminish. Tendency to prolapsus of mucous membrane. Irritation and excoriation of skin. Spur between upper and lower portions of bowel. Many cases recover spontaneously. When opening is high up in small intestine, general nutrition suffers considerably by escape of chyle. *Treatment*.—Zinc ointment round aperture; bag to catch fæces, or plug to retain them temporarily; cleanliness. When the condition persists, operate. Divide spur gradually with Dupuytren's enterotome; division should occupy several days. Then close artificial anus with hare-lip pins, after

paring edges. *Fecal fistula* is a very mild degree of artificial anus, which usually closes spontaneously. Otherwise treat it on general principles.

Reduction en masse.—In the course of taxis, hernia disappears, but symptoms of strangulation come on or remain. Bowel has slipped, not back into peritoneal cavity, but sideways between peritoneum and muscles of abdominal wall. Two varieties: in one, bowel bursts through a hole in neck of sac; in other, sac as well as bowel is misplaced. *Signs*.—If surgeon himself causes the misfortune, he notes the absence of that sudden jerk with which a hernia properly reduced usually disappears. The history of the case points to the occurrence. Symptoms of strangulation remain unrelieved. *Treatment*.—Operate; open sac; pull bowel out of its malposition; divide stricture and reduce. An *intra-parietal sac*, a diverticulum from the ordinary sac, sometimes exists. A hernia may be pushed into it instead of into abdomen.

After-treatment of Herniotomy.—Chiefly negative. Rest in bed; liquid food till the bowels have acted; opium unnecessary; no purgatives; enema if bowels do not act spontaneously within ten days. If peritonitis should arise, it must be treated promptly and vigorously, like peritonitis from other causes.

IRREDUCIBLE HERNIA.—*Causes*.—1, Adhesion; 2, neglect of reduction combined with hypertrophy of the herniated parts. Adhesions of the parts uncovered by peritoneum make all herniæ of the bladder and cæcum irreducible. Omentum is apt to become irreducible. *Treatment*.—Gradual compression by a bag made to lace up, as advised by Langton. Combine this with pot. iod. internally.

SPECIAL HERNIÆ.—Birkett's classification:

I. *In the Epigastrium*.—1. Diaphragmatic. 2. Epigastric.

II. *In the Mesogastrium*.—1. Ventral (also in other regions). 2. Umbilical. 3. Lumbar.

III. *In the Hypogastrium*.—1. Inguino-scrotal (labial in female). 2. Femoral. 3. Obturator. 4. Perineal. 5. Pudendal. 6. Vaginal. 7. Ischiatic.

Diaphragmatic Hernia.—Three kinds, viz.: 1, congenital, left leaflet of centrum tendineum usually absent; 2, ordinary, abdominal viscera pass through one of the naturally deficient parts of the diaphragm, usually close to ensiform cartilage; 3, traumatic, through a wound. Birkett adds to these, cases of relaxed diaphragm bulging upward from pressure of viscera below. *Signs*.—Malposition of viscera may be detected by auscultation and percussion. Occasionally symptoms of obstruction, strangulation, or impeded respiration. Perhaps history of accident.¹ In traumatic and congenital cases there is no sac. *Prognosis*.—Traumatic cases usually fatal. Others may never even be suspected during life. *Treatment*.—Nil.

¹ In one case the affected side of thorax was disproportionately large.—Garlik, Pathological Transactions, 1879.

Epigastric and Ventral Hernia are to be recognized and treated on general principles.

Umbilical Hernia.—Appears commonly either in infants or fat middle-aged women. Umbilical hernia in infants, though termed “congenital,” differs from congenital inguinal hernia, in having to form its own sac by pushing peritoneum before it. *Coverings*.—Skin, fat, and fascia usually matted together. Neck of sac thickened and strong. *Contents*.—Various. Stomach, small intestine, omentum. Often very large. *Prognosis*.—In infants tendency is toward spontaneous cure. Obstruction a more common accident than strangulation. *Treatment*.—Cork and strapping; pad and bandage; proper trusses or abdominal belts for severe cases. In operating for strangulation divide the coverings very carefully. See also treatment of hernia in general, above.

Inguinal Hernia.—Classification: I. Direct or internal. II. Oblique or external, including (1) common or scrotal, (2) congenital, (3) funicular, (4) infantile. *Direct* comes out internal to deep epigastric artery, *i.e.*, in triangle of Hesselbach. *Oblique* descends externally to deep epigastric artery, *i.e.*, comes down inguinal canal. *Common scrotal hernia* has a sac altogether independent of tunica vaginalis, and usually lying anterior to it. *Congenital* has for its sac the unclosed tunica vaginalis testis. *Funicular*.—“Hernia into the funicular process of the peritoneum,” occupies the funicular portion of the tunica vaginalis, which peritoneal process has, in this case, closed only at or near the external abdominal ring. *Infantile or Encysted Hernia*.—This occurs when the tunica vaginalis is unobliterated from the testicle up to the external abdominal ring. The sac lies enveloped in the tunica vaginalis. “*Hernia en bissac*” is a kind of congenital hernia in which the intestine has burst through a constricted part of the tunica vaginalis. The tunica vaginalis may have been completely divided by a septum at the seat of constriction before the hernia forced its way downward. *Bubonocoele* is an inguinal hernia which lies wholly in the inguinal canal. *Diagnosis of Congenital from the Ordinary Scrotal Hernia*.—Congenital hernia occurs in children and youths, appears suddenly, descends rapidly, and envelops testicle. Ordinary hernia occurs in adult age, descends slowly, and is separated from testicle. Infantile hernia, etc., are recognized after death or during operation. In operating you divide, in common scrotal hernia, congenital hernia, funicular hernia, hernia *en bissac*, one serous layer; in infantile or encysted hernia, three serous layers. In congenital hernia testicle is found in sac. *Diagnosis of Hernia from other Inguinal and Scrotal Swellings*.—A. Inguinal swellings.—1. Encysted hydrocele of cord, though often reducible, is otherwise altogether unlike a hernia, being transparent, oval, very defined, and tense. 2. Undescended testis. Testis is, of course, absent from scrotum. It gives the characteristic pain on pressure, and is irreducible. Inflamed testis in this situation causes symptoms like those of strangulated hernia. Still the vomiting is per-

sistent and continuous, not gushing. Diffused hydrocele of the cord, hæmatocele of the cord, tumors of the cord, may, like elephantiasis scroti, be left to the surgeon's common surgical knowledge and common sense. B. Scrotal swellings.—1. Ordinary hydrocele. Begins at bottom of scrotum, has usually no neck extending up into inguinal canal, is tense or fluctuating, transparent, without impulse, and generally of characteristic pyriform or oval shape. But hernia and hydrocele may coexist. 2. Hæmatocele. Cord defined, no impulse. Perhaps ecchymosis. 3. Varicocele. Worm-like feel. Though reducible when patient is recumbent, yet appears again when he stands up, in spite of finger placed over inguinal ring. 4. Tumors of testis. Cord may be thickened but is usually clear. Testis itself involved. Tumor heavy, opaque, perhaps hard and irregular. Of course no impulse. Often pain. *Treatment*.—See that of hernia in general. Pad of truss should cover whole of inguinal canal in oblique inguinal hernia, and should never compress cord against pubes. In operating for strangulation, constriction is mostly found either at neck of sac or at external abdominal ring.

Femoral Hernia.—Hernia into the crural sheath. Almost always comes through femoral, i.e., crural, ring. In a few rare cases has been seen external to femoral vessels. Occurs much more in women than in men. But it must not be thought that inguinal hernia is uncommon in women. In childhood and youth, hernia in females is almost always inguinal; after forty years of age it is usually femoral. For *coverings, relations, etc.*, vide books on anatomy. *Signs*.—General characteristics of hernia. Situation of tumor: it appears below Poupart's ligament, just external to spine of pubes, and, though at first descending, eventually turns upward and outward in a direction parallel to Poupart's ligament. Femoral hernia is not large usually, but occasionally attains an enormous size. *Diagnosis*.—Sometimes difficult. From 1, enlarged glands; 2, psoas abscess; 3, varix of saphena. Enlarged glands have no impulse, are often multiple, may have an obvious cause, e.g., an inflamed bunion. Also they can usually be felt to have no base like the neck of a hernial tumor. In psoas abscess fluctuation can often be produced from one side of Poupart's ligament to the other, that is from the thigh to the abdomen, and *vice versa*. It cannot be reduced with a gurgle like a hernia. Manifest spinal disease may co-exist. Varix probably extends some distance down saphena; and, though reducible in the horizontal posture, it rapidly returns in the erect, in spite of the finger placed over the crural ring. Femoral and inguinal herniæ are distinguished from each other by their relations to Poupart's ligament and the pubic spine, and by the state in which the inguinal and crural rings are found. Although a femoral hernia may ascend, yet its neck is always below Poupart's ligament. *Prognosis*.—Femoral hernia, very liable to acute and fatal strangulation. *Treatment*.—Best truss probably moe-main. In case of strangulation, flex and abduct thigh during taxis. In

operating, cut upward. Notch slightly because of danger of wounding abnormal obturator artery. Seat of stricture may be falciform process of Burns, Gimbernat's ligament, deep crural arch, or neck of sac itself. Use of term "Hey's ligament" ought to be abolished as unnecessary and confusing.

Obturator Hernia.—Very rare. *Signs* obscure. Fulness below Poupart's ligament, beneath rather than internal to femoral vessels. Pain down inner side of thigh. Femoral ring found normal. Age of patient usually advanced. "Symptoms of obturator hernia may be those of chronic obstruction associated with emaciation."—Goodhart: "Pathological Transactions," 1876. Operation for strangulation would be conducted on general principles with due care of blood-vessels. It would resemble that for femoral hernia, but fascia lata and pectineus would require incision.

Herpes.—A dermatitis resembling eczema, but different from it because the vesicular eruption is more marked and the actual cutaneous inflammation less marked than in eczema, and also because it runs a cyclical course. *Classified* according to locality into herpes labialis, herpes preputialis, etc., and according to form into common herpes, herpes circinatus, herpes iris, herpes zoster. *Causes.*—Nervous origin of herpes zoster, connection of herpes facialis with influenza and pneumonia, and of herpes preputialis with temporary local irritation. (Eczema arises mostly from chronic irritation.) *Signs.*—See definition. Vesicles appear in successive crops, their contents grow turbid, then scabs form. These scabs fall off within a fortnight. Burning pain. Febrile disturbance. Eruption may correspond to distribution of some nerve. Herpes iris and circinatus have smaller vesicles, spread concentrically, desquamate instead of scabbing, and are usually of parasitic origin. *Treatment.*—Soothing and protective. Cotton wool for herpes zoster. Zinc ointment for herpes preputialis. For herpes circinatus (ring-worm), blistering fluid, which should be applied quickly and then washed off at once with water. Ung. hydrarg. ammon., or tinct. iodi., or lin. crotonis. See Alder Smith, on "Ring-Worm."

Hip Disease.—Morbus coxæ. Disease of hip-joint. *Causes.*—Predisposing are scrofula and the ages of childhood and early youth. Exciting are local injuries, often very slight, and exposure to cold. Cause often uncertain. Affections of the generative organs sometimes cause hip disease, probably in a reflex manner. *Varieties.*—Hip disease has been divided anatomically according as it affects the femur only or the acetabulum. In many cases both are involved. Also it may be acute, subacute, or chronic. Or it may be strumous or purely traumatic or rheumatic in origin. Practically it is rarely possible to say whether a given case is or is not strumous. Some diseases of the hip-joint, *e.g.*, chronic rheumatic arthritis, never have the term "hip disease" applied to them. *Symptoms.*—Three stages: 1st, inflammatory; 2d, stage of abscess; 3d, stage of real shortening. Inflammatory stage. Before the symptoms are well marked, the term "in-

incipient" is used. Stiffness of joint. When patient lies on his back his knee is bent upward. If an attempt be made to straighten it, the small of his back becomes hollow, because the pelvis moves with the femur. Wasting of limb, often a very early symptom: flattening of buttock and obliteration of gluteal fold. Pain often referred to inner side of knee. Pain is most severe when disease begins in the bone. Fulness over joint, best marked when disease begins in synovial membrane. Apparent lengthening, sometimes apparent shortening, both due to rocking of pelvis. Very rarely real lengthening, due to effusion into joint. Of course the patient limps. 2d stage. Stage of abscess. The suppuration is sometimes entirely outside joint. Pus burrows, fluctuation occurs, sometimes in one place, sometimes in another; sinuses form. Probe very likely fails to find dead bone. Sayre's vertebrated probe useful. Situation of sinuses indicates situation of disease, whether acetabular or femoral (*see* "Pathology"). Before abscess opens, 3d stage has usually commenced. 3d stage. Stage of real shortening. This results from the gradual destruction of head and neck of femur by caries or necrosis, usually by caries. Top of trochanter ascends above Nélaton's line, a line drawn from ant. sup. spine of ilium to tuberosity of ischium. Abscesses or sinuses, lordosis, flexion of thigh on abdomen, wasting of buttock and thigh and pain continue as in former stages. The disease naturally terminates either in death from exhaustion or amyloid disease, or in recovery with ankylosis. The ankylosis is in the flexed position and accompanied by a compensatory spinal curve of the kind called lordosis.

Pathology.—Disease may begin either (1) in the bone near the joint, or (2) in the soft tissues, synovial membranes, or ligaments of the joint. In the latter case the disease is sometimes named "arthritic." It is a generally accepted doctrine now that the only joint disease which begins in the cartilage is chronic rheumatic arthritis. For a description of the general changes which take place in hip disease, *see* DISEASES OF BONES AND OF JOINTS. Ligamentum teres soon gives way. Head of femur perishes by caries or by necrosis. If acetabulum is affected, it is apt to perish partially by necrosis, often becoming perforated. Even when head of femur is destroyed remains of neck of femur rarely leave acetabulum. True dislocation on dorsum ilii does occasionally occur, or, acetabulum being perforated, head of femur may slip through into pelvis. The natural tendency is toward a cure by ankylosis. In acetabular disease, sinuses usually form in buttock, or close to pubes. In femoral disease they usually open lower down thigh, especially below and in front of great trochanter. *Diagnosis.*—Most cases of hip disease are unmistakable. Sometimes difficult to distinguish incipient hip disease from other affections which cause pain about the hip, accompanied by lameness, common rheumatism for example. In fact many cases of hip disease do actually begin as rheumatic synovitis. No disease of the parts about the hip causes such stiffness of the joint:

that is a great point. Pain in the knee may lead off the attention to the wrong place. Many affections, *e.g.*, curvature of spine and hysteria, cause rocking of pelvis and apparent shortening or lengthening. In healthy people, the lower extremities are often slightly unsymmetrical.¹ But in such persons if one leg is much shorter than the other, the feet will probably also be disproportioned. Comparative measurements should be taken from ant. sup. spine of ilia to upper or lower end of patella or to inner malleoli. Nélaton's line, Bryant's ilio-femoral triangle. Bryant's ilio-femoral triangle is formed by a horizontal line across top of trochanter, a perpendicular line from ant. sup. iliac spine downward, and an oblique line from ant. sup. iliac spine to top of trochanter. The lines are equal on both sides in normal persons. Enlarged bursa under psoas is very rare; and the pain, if present, is relieved not aggravated by flexing thigh on abdomen. Hip-joint disease could hardly be accompanied by such marked swelling over the joint without presenting characteristic and marked symptoms. Hysteria must be diagnosed on general principles. See HYSTERICAL DISEASES OF JOINTS. It would really be a waste of space to give the diagnosis of hip disease from psoas abscess, sacro-iliac disease, and congenital dislocation; for it may be assumed that the surgeon will not try to diagnose a doubtful case without taking the patient's clothes off, and manipulating carefully. *Prognosis* depends on stage of disease, original constitution of patient, present condition of patient, on parts actually diseased, and on age of patient. In first stage of disease, especially if symptoms point to origin in joint itself, treatment may be expected to result in recovery with or without ankylosis in good position. Scrofulous patients are very likely to become tuberculous elsewhere when the bone is affected. When necrosis or caries has occurred, prognosis is very bad as to life. It is worse in adults with acetabular disease. The only cases in which recovery without ankylosis is to be reasonably looked for are those in which the cartilage and bone have never been affected. *Treatment*.—Rest of the joint essential. Sayre's splint is supposed to make rest in bed unnecessary in many cases in which the disease has not too far advanced. Extension by pulleys and weights (3 to 10 lbs., according to age and individual peculiarity of patient). Long splint (long splint on sound side, weight to diseased limb); Thomas' splint, plaster cases, leather cases, etc. Treatment should be continued so long as there is any tenderness or sign of active disease and for a little longer. Limb should be straightened under chloroform, if weight fails to bring it down gradually and easily. Inflammatory reaction after this manipulation may be treated by ice or by hot poultice locally, according to which seems to act best. When there are signs of struma, give cod-liver oil and iron. In suppurative stage, treat abscesses and sinuses on general principles. *Question of Excision*.—When

¹ See Garson, *Journal Anatomy and Physics*. 1880.

suppuration continues, patient's exhaustion increases, and there is evidence of bone disease; and, especially if the patient's circumstances are so poor that he cannot get proper attention during long rest in bed, the surgeon is justified in operating to remove the dead bone. Still the operation has its dangers, and the resulting limb is likely to be shorter than after the natural cure. Moreover it is very difficult, sometimes impossible, to thoroughly remove pelvic necrosis. For operation, *vide* article **EXCISION**.

Horns.—*Vide* **WARTS**.

Housemaid's Knee.—*See* **BURSÆ, ENLARGED**.

Hydatids occur in bones, breast, muscles, and other parts, and, in surgery, are rarely diagnosed from other cysts till operation has let out hooklets, etc.

Hydrocele.—An accumulation of serum forming a swelling in connection with the testicle or spermatic cord. *Varieties.*—1. Hydrocele of the tunica vaginalis testis (common hydrocele). 2. Hydrocele of the cord (sometimes called "encysted hydrocele of the cord"). 3. Encysted hydrocele (frequently called "encysted hydrocele of the epididymis," or "of the testicle"). 4. Diffused hydrocele of the cord. 5. Congenital hydrocele. 6. Infantile hydrocele.

Hydrocele of the Tunica Vaginalis Testis.—*Causes.*—Middle age, weak constitution, and gout predispose. Injury and orchitis excite. In most cases there has been no known exciting cause. *Signs.*—A scrotal tumor, smooth, oval, pyriform, or globular (often constricted in the middle); elastic, tense or fluctuating, transparent or semi-transparent (rarely quite opaque). No connection with abdomen. Cord free near abdominal ring. No impulse on coughing. Penis gets "absorbed," as it were, into tumor. *Diagnosis.*—*Vide* **HÆMATOCELE** and **INGUINAL HERNIA**. *Treatment.*—1, Palliative; 2, radical cure. Palliative = tapping with trochar and canula, or mere use of discutient lotions + suspensory bandage. In tapping, make out position of testicle by palpation, by assistance of patient's sensations, and by use of candle and stethoscope. Grasp tumor firmly in left hand, so that testicle lies in centre of left palm. Plunge trochar obliquely upward and backward into junction of middle and lower thirds of hydrocele. The fluid usually collects again. Lotio ammoniæ hydrochlor. (ʒj. to ʒvj.) used as a discutient. Radical cure.—First empty the hydrocele, then inject two drachms of port wine or of tinct. iodi and water, equal parts. Let the injection flow out after a minute or two. Platinum canula should be used for tinct. iodi. Lewis recommends carbolic acid and glycerine, aa ʒss., instead of iodine, and says it is less painful. Treatment by seton not to be recommended. *After-treatment.*—Bed for two or three days. *Pathology.*—A serous dropsy of the tunica vaginalis, probably of chronic inflammatory origin. The radical cure acts by checking the secretion of the tunica vaginalis, and rarely results in the production of adhesions.

Hydrocele of the Cord.—Its pathology is probably that of a dropsy of a

small unobliterated part of the tunica vaginalis funiculi. It may sometimes be an independent cyst. Its appearances are quite characteristic. It is transparent, feels like a pigeon's egg, only more elastic, and slips up and down between the fingers with great mobility. You may fancy that you have reduced it into the inguinal canal, when suddenly, in a humorous way, it may be discovered half-way down the cord toward the testicle. Occurs in the young. *Diagnosis*.—Only in rare cases, when it extends right into inguinal canal, and patient is so fat as to hide transparency, can this affection be mistaken for a hernia. *Treatment*.—Tap and inject with tinct. iodi and water, equal parts. Before injecting be sure that the case is not one of "congenital" hydrocele.

Encysted Hydrocele.—*Signs*.—Those of cyst attached to the testicle, usually to the head of the epididymis. *Pathology*.—A cyst containing sometimes pure serum, but frequently a mixture of serum and seminal fluid. An opening has often been found between the seminal tubules and the cyst. The cyst may originate from a dilated seminal tubule, or from a dilated cavity in the connective tissue, or, according to Osborne, from enlargement of the "hydatid of Morgagni." *Treatment*.—Same as that of ordinary hydrocele.

Diffused Hydrocele of Cord.—Unknown to living surgeons. Described by Pott. But hydrocele of cord sometimes receives this name if it forms a long, rather ill-defined tumor.

Congenital Hydrocele.—Tunica vaginalis funiculi is open, as in hernia, into tunica vaginalis testis, but the open process contains peritoneal fluid instead of intestine. *Treatment*.—Puncture with fine trochar, and then try to close the opening by the pressure of a truss.

Infantile Hydrocele.—Occurs in infants in whom tunica vaginalis has only closed at external abdominal ring. *Treatment*.—Discutient lotions. Puncture. If it is certain that there is no communication with peritoneal cavity, iodine injection may be employed in obstinate cases. Many cases disappear with very little treatment.

Hydrophobia.—A disease which develops primarily only in the dog, and from unknown causes; but which is communicable by inoculation with the saliva of dog, cat, man, or any other animal who may suffer from it.

Symptoms in Dog.—Two forms (or two stages?), viz.: 1, a raving madness; 2, a quiet madness. Certainly these stages do sometimes follow each other in the same dog. Or three stages may be distinguished: 1, of dulness with restlessness; 2, of fury; 3, of paralysis. In the first stage the animal wanders about in a fidgety, uncomfortable manner, is evidently ill, and looks suspicious, unhappy, and distrustful. In the second stage, much of the fury is evidently due to hallucinations. He bites, but it is often at imaginary enemies, and he may still be mindful of his master's voice. In the third stage, paralysis makes the voice muffled or inaudible, the jaw drops, and the legs totter and fail. Finally death comes from ex-

haustion. The mad dog rarely shuns water, but laps it without swallowing.

Hydrophobia in Man.—Proportion of bitten cases attacked, estimated by Trousseau at one in two, by Billroth at one in twenty! Period of incubation: six weeks to more than a year. Rarely less than six weeks. *Symptoms.*—Firstly, great irritability, excitement, and restlessness. Spasms on attempting to swallow occur sometimes, but rarely, in this stage. Irritability and sensitiveness to light, sound, etc., increase and become excessive. Soon the slightest causes produce spasms. Then gradually comes the fear of water, together with unspeakable thirst. Sleeplessness. Terror of the spasms and their causes. Actual madness occurs rarely. Appearance of most fearful anxiety. Hoarseness. Frothing at the mouth. Severe tetanic spasms now, from time to time, suspend respiration; and, finally, in one of these, the patient dies asphyxiated. Note the different ways in which death occurs in the dog and in man, for in the former it comes by exhaustion. *Diagnosis.*—1. From tetanus. In tetanus there is a certain amount of persistent spasm, in hydrophobia there are intervals of complete relaxation. Tetanus is also a quiet disease, so to speak, and is unaccompanied by horror of water, even although the sufferer may be unable to drink. 2. From hysteric or neuromimetic hydrophobia. In the sham disease there is dysphagia, but no alarming spasm of the respiratory muscles. *Prognosis.*—Hopeless. *Pathology.*—Congestion of spinal cord has been observed with collection of leucocytes around the capillaries. *Treatment.*—All remedies hitherto tried have been vain. Suffering may be alleviated by rest, darkness, and perhaps by anæsthetics. Try tracheotomy. With regard to prophylaxis, cauterization should be done, early if possible, but better late than never. Surgeons of great ability have named various limits of time at which they say cauterization ceases to be of any use. These limits differ considerably, and, in my humble opinion, it has yet to be shown on what sufficient grounds they have been fixed. One may ask for *demonstration* that the poison does not remain near the wound during the period of incubation. Cauterization may be painful and obnoxious; but what are these considerations when compared with the faintest chance of preventing the most horrible of diseases? Vesicles ("lyssi") appear near frænum linguæ between third and twentieth day after bite. It has been recommended to examine patient twice a day during this period, and lay open and cauterize the lyssi as they appear. Trousseau supports this recommendation.

Hypertrophy.—Increase in size of the tissues of a part, not the mere natural result of growth in youth. Sometimes accompanied by increased development of the individual microscopic constituents of the tissue: *e.g.*, when the gravid uterus enlarges, the individual muscle-cells also grow. *Causes.*—Exercise, irritation, hyperæmia, general over-feeding, special over-feeding, certain special diseases. Irritation may be direct or indirect.

An example of indirect irritation as a cause is hypertrophy of breast from uterine irritation. Irritation certainly acts partially, if not wholly, by producing hyperemia through reflex inhibition of vaso-motor system. By special over-feeding is meant the excessive deposit of fat which may result from taking fat-forming food to excess. As examples of hypertrophy from special diseases, may be cited the large joints of rickety children and the thickened skin in elephantiasis scroti. *Treatment*.—Remove cause. Favor venous circulation. Pressure. Treat special diseases. Operative measures. *Vide* various articles in this book on hypertrophy of particular organs and parts.

Hysteria.—Hysteria is, according to custom, held to be in the province of the physician, and the surgeon is called in when "this protean malady" assumes the outward form of surgical disease. Hence the best general articles on hysteria are to be found in medical treatises. From the surgeon's point of view, Mr. Savory treats the subject graphically in Holmes's "System," vol. i. Its *essential nature*. Paget has called it "madness of the spinal cord;" but its phenomena are, perhaps, more easily explained on the supposition that it arises from "a nutritive derangement of the general nervous system, both central and peripheral." (Hasse, as quoted by Niemeyer). *Causes*.—No doubt a congenital predisposition often exists. In most cases there is certainly to be found an exciting cause in the form of chronic irritation of some system or organ of the body, usually the genital organs. Uterine infarctions, ulcerations, and flexions. Ovarian diseases. Abnormal sexual irritation, onanism. If you want to cure your patient, do not let modesty or benevolent belief in human nature blind you. Do not ignore those causes which undoubtedly second what is usually the prime cause; but there is much less fear of this error than of the error which consists in being satisfied with the discovery of some psychical explanation of a given case, *e.g.*, excessive intellectual exertion, or unhappy married life. The surgeon must judge the causation from objective symptoms. Slight degrees of hysteria are not at all uncommon in men; but almost all marked cases occur in women. Usual age from twelfth year to twentieth, and again at the "change of life." Sedentary occupation. Town life. Bad training in childhood. *Signs*.—1. Derangements of sensibility. General hyperæsthesia, "nervousness." Great acuteness of the senses. Idiosyncrasies. Desires for peculiar foods, objections to common foods, etc. Neuralgias. Painful and tender breasts, migraine, face-ache, and other pains. Clavus hystericus—that is, pain in one small point in the head. Tenderness of the back. Severe pains and exquisite tenderness in some joint or other. In contrast with above symptoms are the frequent cases of real or pretended anæsthesia. Difficult to tell whether some cases of hysterical anæsthesia are real or sham. Unnatural consciousness of the actions of healthy organs of the body. Palpitations. Sense of weight in epigastrium during digestion. Great thirst. Frequent

desire to pass water. 2. Hysterical convulsions. These vary in intensity from slight local spasms to severe general spasms with opisthotonos or other convulsive curvature of the spine. In these attacks patient never loses consciousness. Yawning, laughing, crying, globus hystericus. Eructations. 3. Curvature of the spine. Affections of joints. 4. Derangements of vaso-motor system. Cold hands and feet. Sudden and prolonged flushing of the face. Hyperæmia of kidney, causing large flow of limpid urine, "urina spastica." 5. Mental symptoms. Rapid alternations between grave and gay. General tendency is toward depression. Craving for sympathy. It is this craving, probably, which produces a tendency to exaggeration and malingering. Of course all the above remarkable symptoms cannot be looked for in the same case. *Diagnosis*.—Hysteric imitations of organic disease are always imperfect; because hysteria, if one may be allowed to personify it, is quite ignorant of pathology and knows little of anatomy. Hence pain rarely confines itself with accuracy to any defined anatomical structure or region. In hysteric joint affections the skin over the joint is often exquisitely tender, while deep, firm pressure upon the joint itself may cause little or no pain. At the same time the limits of that portion of skin which is tender bear no relation to the distribution of any known nerve or vessel. Subjective symptoms last even for years without producing any corresponding alterations in the structure of the affected part. A hysterical patient describes her sufferings in a characteristic way. It is not difficult to make her smile and talk with cheerfulness and liveliness even when the subject is pain which she describes as "agonizing," "unendurable," "excruciating." Hysteric spasms disappear under anæsthetics and often also during sleep. There are, also, concomitant general signs of hysteria. *Prognosis*.—Some cases of hysteria resist all treatment. Many of these have one foot across the narrow line which separates hysteria from insanity. *Treatment*.—Treat the cause, whatever that may be. Moral treatment: encourage and lead the patient to exercise her will. Hysteria often attacks persons who have never in childhood been taught to control themselves. Sea-bathing, cold shower-baths, early rising, open-air life, tonics, bromide of potassium. "Antispasmodics," valerian, asafoetida. Electricity is invaluable in treating many neuromimetic (*i.e.*, hysteric) diseases. Contracted joints may be extended under ether and then fixed by splints. For Hysteric Paralysis, try metallotherapy.

Impetigo.—It is nearly allied to eczema, and eruptions are common which are intermediate between the two. But impetigo is a pustular, not a vesicular disease, and forms thick crusts and scabs. *Causes*.—Chronic irritation; for instance, "grocer's itch," an impetigo of the hands, is caused by constant contact with sugar. Dirt, lice, contagion, syphilis. *Situation*. Usually head, hands, or face. Pustules usually correspond to hair-follicles. Syphilitic impetigo occurs in large patches. *Treatment*.—Poultice to fetch off scabs. Ung. zinci; ung. hydrarg. ammon.; ung. sulphuris, and

mixtures of these ointments. Treat general health, and syphilis if present. Sulphur baths.

Impotence.—Incapacity for sexual intercourse. Note the difference between this definition and that of sterility. Impotence occurs in women as well as men. *Causes.*—1. Original malformation of copulatory organs; marked epispadias or hypospadias; absence or occlusion of vagina and double vagina. 2. Accidental deformity of copulatory organs; amputation of whole penis; occlusion or obliteration of vagina by cicatricial contraction. 3. Organic affections of the less superficial genito-urinary organs; spermatorrhœa; varicocele; castration. 4. Nervous influences. The condition called “irritability with weakness” usually depends on both third and fourth class of causes. When impotence is not the effect of visible malformation, it almost always is the result of masturbation, very rarely of sexual excess. Masturbation usually leads, in the first place, to “irritability with weakness.” Here ejaculation takes place before entrance is effected, or else erection is impossible, and, consequently, copulation impossible. This condition is not always the result of masturbation. Disgust for the female, or the fear of sin or of contagious disorders, doubtless causes it in some cases. *Signs and Prognosis.*—Some are given in the preceding paragraphs. Sometimes the genitals are flabby, cold, and small. If, in such cases, erections *never* occur, not even in bed in the morning, the prognosis is not very good. But so long as erections occur at all, the prognosis is very hopeful. *Treatment.*—Four principles: 1, strengthen general health; fresh air, sleep, moderation in all things—in exercise, in diet, and in mental work; 2, avoid all unnatural excitement of genital organs; 3, treat any physical defect which can be found. If there is the slightest sign of varicocele or relaxation of scrotum, give patient a suspensory bandage; 4, to complete the cure—at all events, to demonstrate the cure to the patient—requires the moderate and regular practice of sexual intercourse for a short time. Of course, it is right that this should be done in the marriage state. Paget writes: “Some will expect you to prescribe fornication. I would just as soon prescribe theft or lying, or anything else that God has forbidden. Celibacy does no harm to mind or body; its discipline is excellent: marriage can be safely waited for.” If the patient is already married, attend to the first three indications, give some mysterious and harmless medicine, and forbid intercourse for three weeks. “The nonchalance that he thus acquires during sexual excitement, and inattention to the strength and duration of the erections, render cohabitation possible, and he has the first successful coitus during the time it was forbidden.” Lallemand’s porte-caustique. A solution of argenti nit. (gr. v. to ʒ j.) is applied to prostatic part of urethra every day. This is a treatment now unjustly neglected. Faradization of inner surface of thigh, of testicles, and lower part of spine. Constant current to spine. “Positive pole over fifth dorsal vertebra, negative

over sacrum, or perinaeum. Three or four sittings a week, one to three minutes each." Battery, 20 to 30 Daniel's elements of medium size.¹

Incontinence of Urine.—Differs very much in cause and treatment, according as it occurs in children, hysterical young people, or in adults. *Causes.*—1. In children: either wilful laziness or a genuine disease, probably partial anæsthesia of bladder. More remote causes are worms, calculus, and struma. 2. In hysterical girls: *vide* causes of hysteria. 3. In adults: a distended state of bladder, the result of paralysis. Those cases in which the urine can only be retained in the bladder for a short time may be classed with IRRITABILITY OF THE BLADDER, *quod vide*. *Treatment.*—1. Of incontinence in children: remove the cause; treat the patient kindly, rather encourage than frighten him; avoid corporal punishment in children; flannel clothing at night; wake the child every three hours to micturate; try cold douche to spine every morning. Extractum belladonna, gr. $\frac{1}{8}$, or tinct. belladonna, ℥ x. ter die. Tonics; strychnine, cantharides, chloral at bed-time. For hysterical incontinence, treat the hysteria. Cold sitz-baths. For incontinence from paralysis, *see* BLADDER, PARALYSIS OF. Incontinence also arises from enlargement of middle lobe of prostate. *See* PROSTATE, HYPERTROPHY OF.

Inflammation.—*Definition.*—When a structure is attacked with inflammation, there is active hyperæmia of the part itself, accumulation of leucocytes outside its blood-vessels, and a disturbance of its nutrition. In the case of a non-vascular part, the hyperæmia is in its immediate neighbourhood, and, perhaps, the increase of corpuscles is due to the division of the proper corpuscles of the part. So far there is nothing in the above definition to distinguish inflammation from the process of repair. And there can be no doubt that the word "inflammation" is constantly used to name action which is identical with the process of repair, *e.g.*, in the case of most slight localized "inflammations" terminating in what is called "adhesion." Inflammation is usually defined from "repair" by saying that it is "an excess of action." This definition appears to be scarcely satisfactory. When the surgeon says that a wound is inflamed, in ninety-nine cases out of a hundred, if not in the whole hundred cases, the state of things is probably this: Processes identical with those necessary to "repair" have begun around the lymph-capillaries near the wound; whereas the action ought to have been confined to the actual base and borders of the wound itself. The term inflammation, as commonly used in surgery, thus does sometimes mean an excess of action, and sometimes means action which it would be absurd to call excessive, as, for instance, in the very localized "inflammation" which so often prevents extravasation of fæces through a wound of intestine. In the latter case the phenomena of "inflammation" cannot be shown to differ from "repair." In the former they differ

¹ See Dreschfeld, Practitioner, vol. xiii., p. 360.

in this respect, namely, that the processes have spread from the region where they might have been useful to the vessels around the neighboring lymphatics, where they are worse than useless.

Caution.—I do not recommend the student under examination to trouble himself about the immediately foregoing remarks. He will find most safety in merely speaking of inflammation as a “perverted vital action” or “modified nutrition,” and then plunging instantly into a description of its observed phenomena, etc.

Causes.—A. Predisposing: 1, plethora, especially if coincident with a weak circulation; 2, local congestion; 3, impurity of the blood, such as arises from kidney or lung disease; 4, alcoholism; 5, chronic inanition (? does this cause inflammation or only modify it in an evil manner); 6, atheromatous arteries; 7, defective innervation; 8, bodily state left after certain zymotic diseases, *e.g.*, measles and typhoid; 9, specific “diatheses,” *e.g.*, gouty, strumous, and rheumatic; 10, congenital peculiarities. The above list could be amplified *ad infinitum* by going into detail, *e.g.*, Cause 2 includes all the causes of oedema and dropsy, varicose veins, pressure of tumors on veins, etc., etc. B. Exciting causes: 1, physical; 2, chemical. Both these may be either of external or internal origin, *e.g.*, a joint may inflame from the physical irritation of a contusion, or of a loose cartilage, or from the chemical irritation of an iodine injection or of gouty products. The common practice of classing quite separately the morbid products of the body itself is illogical; for these products act either physically or chemically; 3, injuries or diseases of nerves; 4, specific influences. Physical causes include blows, wounds, strangulation, etc.; chemical include effects of strong acids and alkalis, and of septic material. An example of inflammation following nerve-injury is that of the eyeball which follows injury of the ophthalmic nerve. Specific influences are such as syphilis, small-pox, and measles. The action of heat and cold are partly chemical and partly physical.

Phenomena.—Classical signs: pain, heat, redness, swelling. *Pain.*—results from either tension or compression of nerve-fibrils. Its character and intensity vary with the locality. Osteitis causes aching, phlegmonous erysipelas causes throbbing pain, and superficial inflammations produce burning, tingling pains. With pain is associated tenderness. In the nerves of special sense, special sensations take the place of pain, *e.g.*, tinnitus aurium in catarrh of the tympanum, while the intolerance of light in ophthalmia is analogous to tenderness. Pain is often diffused, *e.g.*, pain throughout one side of face and head in toothache; or reflected, *e.g.*, pain in knee from hip disease. *Heat.*—Inflamed parts, except in very chronic cases, feel sensibly hotter than normal. According to Mr. Simon and Dr. Montgomery, the blood leaves the inflamed part hotter than it enters it, and the inflamed part is hotter than either the blood which flows into it or the blood which flows out of it. Continental observations on this question

have been numerous and conflicting. The subject of rise of general bodily temperature is noticed under the head of Fever. *Redness*.—Due to hyperæmia. Bright when there is active fluxion of blood to the capillaries of the part, as is usual in acute inflammations; dull, perhaps blue or brownish red, when the congestion is more passive, as is usual in chronic inflammations. When a non-vascular part inflames, the redness is observed in the neighboring vascular region from which the inflamed part derives its nutrition. *Swelling*.—Partly due to congestion, partly to effusion. Effusion resembles in character liquor sanguinis, but it contains excess of chloride of sodium and of phosphates. It also contains leucocytes and even red blood-corpuscles. As a consequence of excess of chloride of sodium in the effusion, there is a deficiency of that salt in the urine. The characters of the effusion differ in different inflammations; especially variable is the amount of fibrine.

Pathology.—Microscopic observation of an inflamed part, *e.g.*, the web of a frog's foot which has been exposed to irritation, shows appearances which may be described under three heads, viz.: 1, disorder of circulation; 2, exudation; 3, stasis. After describing these, I shall consider the structural changes which take place in the constituents of the inflamed part. 1. *Disorder of Circulation*.—Dilatation of the arteries is the first phenomenon observed in an inflamed region. It is ordinarily preceded by no antecedent contraction. It increases gradually for ten or twelve hours, and remains at its maximum for many hours. Dilatation of the veins follows at a long interval of time. The rate of circulation at the commencement is increased, but this soon changes to the very reverse, viz., abnormal slowness. The cause of the vascular dilatation is undetermined, but a very reasonable hypothesis attributes it to inhibitory nervous influence. Billroth thus states this view: "We actually know such phenomena from physiology; the obstruction of the heart's action by irritation of the vagus nerve, of the movements of the intestines from irritation of the splanchnic nerves, etc. Here a vaso-motor nerve-system is supposed which arrests the contraction of the muscles; could not such a vaso-motor nerve-system also be supposed for the vessels—nerves, irritation of which lessens the tone of the muscles of the vessels and thus renders the walls less capable of resisting the pressure of blood?" That local nerves have an unquestionable influence over the circulation in inflamed parts has been experimentally proved (*see* Holmes's "System," vol. v., pp. 735-6-7-8). Ammonia when used as an irritant to excite inflammation has this exceptional property—it excites a preliminary arterial contraction before the ordinary vascular dilatation. 2. *Exudation*.—As soon as the rate of circulation begins to slacken, white blood-corpuscles or leucocytes begin to accumulate and loiter along the side of the minute veins and capillaries. "In this way the vein becomes lined with a continuous pavement of these bodies, which remain almost motionless, notwithstanding that the axial current sweeps by them

as continuously as before, though with abated velocity. Now is the moment at which the eye must be fixed on the outer contour of the vessel, from which (to quote Professor Cohnheim's words), here and there, minute, colorless, button-shaped elevations spring, just as if they were produced by budding out of the wall of the vessel itself. The buds increase gradually and slowly in size, until each assumes the form of a hemispherical projection, of width corresponding to that of a leucocyte. Eventually the hemisphere is converted into a pear-shaped body, the stalk end of which is still attached to the surface of the vein, while the round part projects freely. Gradually the little mass of protoplasm removes itself farther and farther away, and, as it does so, begins to shoot out delicate prongs of transparent protoplasm from its surface, in no wise differing in their aspect from the slender thread by which it is still moored to the vessel. Finally, the thread is severed and the process is complete. The observer has before him an emigrant leucocyte" (Burdon-Sanderson). But although all the leucocytes observed outside the vessels in the earlier stages of inflammation have probably escaped from the vessels, there is still reason to believe that later accumulations of them are partially due to proliferation of the extra-vascular corpuscles. 3. *Stasis*.—The phenomena of stasis occur at an uncertain time during the course of inflammation, but they are not, as is sometimes stated, the first in order of occurrence. They are twofold; firstly, the blood-current stops altogether, after getting gradually slower and then oscillating; secondly, the colored corpuscles cohere to one another, and adhere to the sides of the vessels till they form an accumulation so dense that the capillaries seem to contain no liquor sanguinis, but only corpuscles. As similar occurrences take place even when milk is substituted for blood, and as the blood drawn in inflammation shows no special arrangement of its corpuscles, it is assumed that the phenomena of stasis are due to a changed condition of the walls of the blood-vessels.¹

Structural Changes which Take Place in Constituents of Inflamed Tissues.

—In non-vascular tissue, such as that of the cornea and of cartilage, the proper cornea and cartilage corpuscles proliferate. But numbers of leucocytes migrate from the vessels around the cornea into its substance. In cartilage the cartilage-cells multiply by division, and then cause the absorption of the stroma in which they lie. In tendon and in muscle similar changes have been observed. In the case of parts lined with epithelium, such as mucous and serous membranes and glands, it is probable that the greater part of the corpuscles of the inflammatory new formation

¹ If the vascular walls permit much of the liquor sanguinis to leak through them, the speed of that which remains in the vessel will be slowed. It is easy to see how retardation of the current of liquor sanguinis would allow leucocytes to accumulate, because of the absence of the normal force which ordinarily washes them along the blood-vessels.—See St. Bartholomew's Hospital Reports, 1878, p. 299.

are escaped leucocytes ; but, at least in the case of epithelial membranes, proliferation of epithelium appears to have been observed.

Further changes are described under headings noticed in the following paragraph.

Terminations of Inflammation.—1, Resolution ; 2, adhesion or organization ; 3, suppuration, including abscess ; 4, ulceration ; 5, gangrene or mortification. These processes are described respectively under the following heads : 1, 2, and 3, WOUNDS, REPAIR OF ; 3, ABSCESS ; 4, ULCERATION ; 5, GANGRENE.

Treatment of Inflammation.—Consider it under heads—A, indications ; B, remedial agents ; C, differences according to whether a case is acute or chronic. A. Indications : 1, to remove all sources of irritation and all predisposing causes ; 2, to lessen local action ; 3, to guard against or treat promptly all complications, or evil consequences ; 4, to support the patient's strength during prolonged and exhausting cases ; 5, to relieve pain. B. Remedial agents. These are either local or general. Local agents—rest, cold, bloodletting, pressure, ligature or compression of artery supplying inflamed part, incisions, antiseptics, warmth with moisture, astringent and stimulating drugs, counter-irritation ; and certain other agents which will be noticed in considering the treatment of chronic inflammation. Constitutional agents are : rest, bloodletting, dieting, stimulation, drugs, mercury, antimony, aconite, belladonna, purgatives, diuretics, colchicum, iodide of potassium, quinine, opium, other anodynes ; diaphoresis ; “spinal” ice-bags. Some of the agents in the above list overlap one another, *e.g.*, “diaphoresis” partly includes “antimony ;” but it is impossible to devise a satisfactory list without this fault.

Rest.—Bed, splints, slings, cradles, bandages (starch, plaster-of-Paris, paraffin, glue, gum, silicate of potash). Position : elevation. Flexion or extension. See JOINT DISEASES AND FRACTURES. *Cold.*—Ice-bags, bags through which a continuous stream of cold water can be made to pass, irrigation, cold douche, wet-packing, evaporating lotions. Excessive cold with wet involves danger of frost-bite. *Local Bloodletting.*—Leeches, cupping, dry cupping,¹ incisions, scarifications, punctures, local venesection (*i.e.*, pricking veins near inflamed part). *Pressure.*—Bandages with sub-jacent layer of cotton-wool ; elastic bandage, pressure regulated by means of india-rubber bags containing water,² shot bags. Ligature, compression or acupressure of artery of inflamed part or main artery of limb. Neudörfer says eight minutes of pressure, three or four times a day, suffice. *Incisions.*—Though mentioned above in connection with local bloodletting, are yet more frequently used to relieve tension. Extent and depth vary ; usually they are about $1\frac{1}{2}$ in. long by $\frac{1}{4}$ in. deep. Avoid vessels and nerves

¹ Of course the dry-cupping is not really bloodletting, but its action is similar.

² See Lancet, November, 1878.

of any size. Cut in axis of limb. *Antisepsis*.—See ANTISEPTIC TREATMENT and WOUNDS. *Warmth with Moisture*.—Poultices, fomentations, water-dressing, spongiopiline. *Astringent and Stimulating Drugs*.—Extract of belladonna and glycerine, equal parts; silver nitrate, tannic acid, and all the various astringent, stimulant, caustic, and sedative drugs used in cutaneous and throat medicine. *Counter-irritation*.—Vesicants, caustics, cautery, moxa, issues, setons, friction, shampooing, poultices.

Constitutional Agents.—*General Bloodletting*. Indications for: Severe inflammations of the contents of the head or thorax, following comparatively slight injuries and attended with a frequent, full, and hard pulse. The bleeding should be full and free from a large vein (*e.g.*, median-basilic), but not pushed to fainting. Repeat if necessary, and if immediate result of bleeding be encouraging. Amount, usually about 10 ounces. *Diet*.—Abstinence from food. Low diet. Former may be prescribed for a day or two in some cases of abdominal injury and inflammation. Low diet almost always beneficial. *Stimulation*.—Full diet; extra nourishment. For cases of low type, when the general weakness seems more threatening than the local inflammation. *Drugs*.—Mercury, antimony, aconite, belladonna, purgatives, diuretics, colchicum, iodide of potassium, quinine, opium, other anodynes. See some book on THERAPEUTICS, and the notices of inflammations of special parts or of specific origin in this book. Aconite very valuable. *Diaphoresis*.—Effected either by drugs (antimony, Dover's powder), or by hot-air baths, blankets, or other physical agents. *Spinal Ice-bag, Spinal Hot-water Bag*.—According to Dr. Chapman, former, by partially paralyzing vaso-motor system, increases the flow of blood to that part of the body which corresponds to the region of the spine to which the ice-bag is applied, *e.g.*, pelvic organs become actively congested and feet warm when ice-bag is applied to lower part of spine. On the other hand, the hot-water spinal bag has an action the very reverse of this; hence the ice-bag can be used to obtain a derivative action, and the hot-water bag to directly contract the arterioles of an inflamed part.

C. *Differences in Treatment, according to whether the Inflammation is Acute or Chronic*.—In acute cases the indications are usually to save life, to check the attack before serious local mischief has been effected, to prevent the spread of a localized inflammation, and to relieve pain. In treating chronic cases the surgeon has rather to attempt the removal of what may be termed pathological habits, and their evil effects. In acute cases he employs such active agents as venesection, free leeching, and the administration of drugs which powerfully affect the nervous and vascular systems (*e.g.*, opium and aconite). In chronic cases resort is had to pressure, friction, counter-irritation, and stimulant or astringent drugs locally (*e.g.*, silver nitrate), with "alteratives" internally (*e.g.*, mercury, iodide of potassium, sarsaparilla). It is especially in many chronic cases that a tonic and generous plan of treatment has to be adopted. In dealing with

chronic inflammations always seek for some long-acting cause, or for some specific influence (*e.g.*, syphilis, struma, rheumatism).

Insects, Stings of.—See BEES, STINGS OF.

Intestinal Obstruction.—*Causes.*—1, Intussusception; 2, strangulation by bands or by congenital diverticula; 3, volvulus or twisting; 4, internal herniæ; 5, strictures—malignant, cicatricial, or simple; 6, pressure of tumors or dragging of the bowel out of place; 7, impaction of feces or of foreign bodies; 8, pouching of intestine; 9, intestinal paralysis. According to Pollock, of 135 cases 24 arose from intussusception, 36 from bands, diverticula, and the like, 33 from intrinsic stricture, 8 from internal hernia, 7 from concretions, calculi, and foreign bodies, 4 from volvulus of sigmoid flexure, 3 from fecal accumulations, 9 from peritoneal adhesions, tubercle, etc., and 8 were doubtful. *Pathology.*—1. *Intussusception.* Portion of intestine, usually lower end of ileum, becomes invaginated in the portion immediately below it. If the case proceeds, the farther invagination takes place chiefly at the expense of the lower, that is, the containing part of the bowel; *e.g.*, an intussusception commencing at the lower part of the small intestine will gradually absorb cæcum, ascending colon, etc., till the cæcum appear even out of the anus. Of course a section of an intussusception would show three concentric cylinders, of which the inmost and middle present serous surfaces toward each other, while the middle and outmost touch each other on their mucous surfaces. Between the inmost and middle cylinders is the mesentery, tapering to a point at the lower end of the involution and causing an arching of the involuted part of the intestine toward its mesenteric border. The orifice at the lower end of the central cylinder, namely that which opens into the bowel below the disease, is a slit and not circular. Peritonitis and adhesions usually occur, though often not till very late in the course of the case. Enteritis occurs and causes mucous and bloody stools. The natural process of cure is for the involuted intestine to inflame, become strangulated, slough, and come away *per anum*. 2. *Strangulation by bands or by congenital diverticula.* Bands are usually adhesions of inflammatory origin; they are often attached to diverticula. Diverticula are mostly found at the lower end of the ileum. They originate either from a partial persistence of the omphalo-mesenteric duct or from a hernia of the mucous coat of the bowel. 3. *Volvulus.* Three varieties; 1st, when bowel is rotated on its own axis, only occurs in ascending colon; 2d, when mesentery forms the axis and is twisted into a cone, only occurs in small intestine; 3d, when one coil of intestine forms the axis round which another coil is bent. Most volvuli occur in sigmoid flexure. Loose flabby mesentery usually found in these cases. 4. *Internal herniæ.* See HERNIA. 5. *Strictures.* Almost all occur in large intestine. Causes: cicatrices of tuberculous or of dysenteric ulcers, or of ulcers caused by irritation of foreign bodies; inflammatory effusion and contraction in the substance of the intestinal wall; cancer. The

last cause is the most common. The pathology of the remaining causes of intestinal obstruction need not be considered in detail here.

Signs.—Vomiting, constipation, abdominal pain; constitutional depression; there are modified and special symptoms added according to prime cause.

Diagnosis.—1st, from other diseases causing vomiting, constipation, and pain; 2d, of the particular nature of a given case of obstruction. 1st, bear in mind possibility that the symptoms are caused by peritonitis, perityphlitis, passage of a gall-stone, impaction of a calculus in the ureter. Abstract of Mr. J. Hutchinson's memoranda for diagnosis: 1. If patient be a child, and the onset of symptoms be sudden—probably intussusception or peritonitis. 2. If an elderly person—impaction of feces, or else malignant disease (stricture or tumor). 3. Middle age—intussusception and malignant disease very unusual. 4. Intussusception causes frequent straining, passage of blood and mucus, incompleteness of constipation, discovery of a sausage-like tumor, either *per anum* or through abdominal walls. 5. Also in intussusception, parietes usually lax, and therefore it is almost always possible to feel the sausage-like tumor by manipulation under ether. 6. Malignant stricture. Old person, continued abdominal uneasiness, repeated attacks of temporary constipation. Constipation often not complete. 7. Tumor should be discoverable either through parietes or else *per anum* or *per vaginam*. Beware of confounding with scybalous masses. (Latter may probably be indented or pressed into a different shape.) 8. If there have been repeated attacks of dangerous obstruction with long intervals of perfect health, suspect diverticula, or bands, or pouching with liability to twist (volvulus). 9. Abdomen hard and distended from near commencement of case, peritonitis almost certainly. 10. Intestines visibly rolling about. Almost certainly no peritonitis. 11. The tendency to vomit is in proportion to (1) nearness of impediment to stomach, (2) tightness of constriction, (3) persistence with which food and medicine have been given by the mouth. 12. Vomiting often absent in cases of obstruction in the colon or rectum. 13. Violent retching and bile-vomiting often more troublesome in cases of gall-stones or renal calculus simulating obstruction than in true conditions of the latter. 14. Fecal vomiting can occur only when the obstruction is moderately low down. When happening early in the case, it is very serious, as it implies tightness of constriction. 15. Hand in rectum may obtain useful information.

Treatment.—First question is that of *gastrotomy*. Indications for gastrotomy are a tolerably clear diagnosis of intussusception, strangulation by band, volvulus, or internal hernia. Of course in many of these cases other means should have been fairly tried before resorting to abdominal section. It is to be remembered on the one hand that most operations of the kind have been fatal, while many cases presenting bad symptoms have

recovered spontaneously ; on the other hand there are cases in which hope of spontaneous recovery is out of the question. Antiseptic precautions will diminish the risk. In cases of incurable stricture, an artificial anus must be formed. *Vide* COLOTOMY. When exact seat of disease is doubtful, operate in right loin. If upper part of large intestine be found empty, bring a coil of small intestine into wound. In certain cases of insuperable obstruction, in which the seat of disease is believed to be above the cæcum, small intestine may be opened through anterior abdominal wall. *Measures not Involving Cutting Operations.*—In all early stages and in all acute cases abstain entirely from giving either food or medicine by the mouth. Make a careful examination under ether administered fully. Copious fluid enemata. Insufflation of air. Latter, though good in intussusception, not to be used where stricture is suspected. For severe pain, give opium or morphia with belladonna. Employ abdominal taxis, that is anæsthetize the patient, invert him, shake him, forcibly knead abdomen, give enemata in inverted position, prescribe prone position with pelvis elevated.¹ Operation should be done antiseptically. Seat of pain may indicate seat of obstruction. Bands are usually found in umbilical region. When the intestines are allowed to escape freely, considerable difficulty in returning them is likely to occur. Still it is sometimes necessary to allow it to a certain extent. Puncture is justifiable, to facilitate their return in cases of difficulty.

Intussusception.—See preceding notice of **INTESTINAL OBSTRUCTION.**

Irrigation.—Practice of passing a continuous stream of water, usually cold, over a wound. Various apparatus. Wide-necked bottle, with skein of worsted or strip of lint acting like a capillary syphon. Tins and india-rubber tubes. The bend where the india-rubber tubing passes over edge of vessel may be prevented from closing tubing up by lashing the curve in the tubing to a metal skewer bent into a gentle curve. Water may be medicated. Object of irrigation is to remove injurious discharges as fast as they are formed, and to keep down inflammation by action of cold.

Ischio-rectal Abscess.—Acute or chronic. Former usually occurs in strong constitutions, latter in weakly persons. *Symptoms.*—Signs common to abscess everywhere. Chronic cases tend to spread nearly around rectum, and to form sinuses which may on the one hand burrow into buttock, and on the other become “fistulæ in ano.” *Causes.*—Blows, kicks, falls, anal fissures, ulcerations, impaction of foreign body in rectum,

¹ Judging from the appearances in a case in which gastrotomy was performed for intussusception, I think that before going through the above proceedings, it would be good, if the intussuscepted bowel had descended as low as the rectum, to attempt to steadily compress the lower end of the intussusception for some time ; because in the above-mentioned case the difficulty in the evolution of the intussusception was mainly caused by the swollen and congested state of its lower end. (Compare with Mr. F. Jordan's mode of reducing paraphimosis.)

phthisical constitution. *Treatment*.—Acute abscess requires poultices, fomentations, and ordinary treatment. Chronic abscesses should also be opened early by free incision, or great danger of fistula will be incurred. Treat general health.

Jaws, Diseases of [Partly noticed under heading, ANTRUM, DISEASES OF].

JAWS, CLOSURE OF.—*Causes*.—1 (very rare), ankylosis of temporo-maxillary articulation ; 2 (usual), cicatricial contraction after burns, scalds, cancrum oris, etc. *Treatment*.—In very slight cases the mouth may be forced open, and cicatrix stretched by screw appliances. But in most cases the only hope of relief lies in osteotomy. Two methods of osteotomy, one from within mouth (Rizzoli's), the other from without (Esmarch's). In the latter, which is preferred, a wedge-shaped piece of bone is cut out of lower jaw anterior to cicatrix. Operation for temporo-maxillary ankylosis consists in operating within the mouth, and cutting piece of bone out of ramus of jaw.

JAWS, NECROSIS OF.—*Causes*.—Blows, exanthemata, syphilis, salivation by mercury, chronic irritation of carious teeth, fumes of phosphorus. Cause sometimes obscure. *Signs*.—Firstly, those of otitis, pain like toothache, swelling, etc.; then suppuration, formation of sinuses, detection of exposed bone, offensive discharge. Effect on general health usually greater than necrosis elsewhere. *Pathology*.—That of other necroses. Phosphorus necrosis is said to attack only where there are carious teeth ; but Langenbeck denies this. Formation of new bone usually redundant ; but it tends to waste when the sequestrum is removed. A sinus opening externally near jaw sometimes merely signifies a carious tooth. *Treatment*.—Treat the cause. Remove sequestrum when it has fairly loosened, but not before. Avoid cutting skin if possible ; if unavoidable, make incisions below edge of jaw, and, in males, where whiskers may cover scar. Whole jaw has been removed piecemeal through mouth. Gargles and lotions of Condyl's Fluid, borax, salicylic acid. In severe cases rest may have to be secured by bandages and gutta-percha or other splints. Tonics, soft nutritious food, fresh air. Fit artificial teeth to new jaw. Specific remedies where indicated. Lower jaw affected oftener than upper. Amorphous phosphorus does not give off the injurious fumes.

JAWS, TUMORS OF, may be cystic, fibro cystic, fibrous, sarcomatous, carcinomatous, cartilaginous, fibro-cartilaginous, or osseous. A fibrous or sarcomatous tumor connected with the periosteum of the alveoli is called an "epulis." This has been noticed under that heading. Cystic tumors are the most common, and are noticed among the diseases of the ANTRUM, *quod vide*. Cartilaginous tumors are rare, but may be very large. Exostoses on the jaw are often of the ivory variety. *Diagnosis*.—See article on TUMORS in general. The chief point is to recognize innocency or malignancy. Malignant growths increase rapidly, are usually softish, infiltrate

neighboring parts, affect glands, are painful, and sooner or later tend to fungate. *Treatment*.—Open simple cysts by a very free incision, stuff with lint, and allow to granulate up. Other tumors must be removed thoroughly with knife, small saw, and cutting pliers. Bad cases may require removal of part or even whole of jaw itself. See EXCISION OF JAW.

EXCISION OF LOWER JAW.—Partial or complete. Done for tumor of the bone. *Incision*.—Depends on extent of bone to be removed. Considerable portions can be taken away through an incision entirely within the mouth. Larger portions require an incision along the lower margin of the jaw and chin. This, if necessary, may be extended upward in the median line toward the lip; but only tumors of rare magnitude justify division of the lip itself. A tumor which reached from two inches above the zygoma nearly down to the clavicle required a curved incision from the front of the ear to and through the lower lip. Many tumors may be almost entirely separated from their connections before even the facial artery need be divided. In the large tumor above referred to, this artery was cut by the last touch of the knife, and tied almost before it spurted. All bleeding vessels should be secured without delay, as free hemorrhage is peculiarly embarrassing in operations about the mouth. In the smaller tumors, a tooth is extracted on each side of the growth, and the jaw partially sawn through and partially divided by cutting forceps. When the symphysis has to be removed, the tongue must be perforated and held forward by a piece of whipcord, lest it fall back and close the glottis. This whipcord may be removed after twenty-four hours. When the ramus is encroached upon, disarticulation is necessary. Then keep the edge of the knife close to the bone, lest the internal maxillary artery be divided. Strong forceps may be useful. Depress the bone well, and open the joint from the front. Do not divide or remove any more mucous membrane than can be helped. It is worth remembering that, in case of dangerous hemorrhage after an extensive operation of this kind, the external carotid, or even the bifurcation of the common carotid, can easily be compressed between the finger in the pharynx and the thumb on the skin of the neck. Anæsthesia should be effected through Trendelenburg's trachea-tampon and tube or Mill's apparatus.

EXCISION OF UPPER JAW.—Complete or partial. Performed for tumor of the bone. *Complete excision*. Incise skin, etc., down to bone along a line through middle of upper lip, round ala of nose, up to near inner canthus of eye, and lastly along lower margin of orbit. Very large growths may require also a cut through cheek from angle of mouth to malar bone. Turn this flap out and divide bone in the following places, in whatever order may be found most convenient in each individual case, but preferentially as follows: (1) zygoma, (2) outer wall of orbit into sphenomaxillary fissure, (3) inner angle of orbit, (4) hard palate and alveolar process, through socket of central incisor tooth, previously extracted. Effect

each division with cutting forceps ; but commence each, except the third, with a narrow saw. Now apply lion forceps, depress the bone, separate remaining adhesions with fingers rather than with knife, and wrench out. Avoid unnecessary injury to soft parts of palate. The removal is comparatively easy in a child, because the sutures are much less firm (H. Marsh). Arrest hemorrhage, pad the cavity, replace the cheek flap. Suture. Hare-lip pins through lip. *Prognosis*.—Large majority of cases recover. Chief dangers, hemorrhage and blood-poisoning. Death on operating-table perhaps commoner in operations about jaw than in any others.

Partial Excision of Upper Jaw.—There are growths which affect so limited a part of the upper jaw that it would be barbarous to remove the whole bone for them. The orbital part may be excised and the palate left, or *vice versa*. Still more limited operations sometimes suffice. The external incision is done in the same line as that for total excision, but made no longer than is necessary in each case.

Joints, Diseases of.—1. Acute synovitis. 2. Acute suppuration (or abscess, or acute suppurative synovitis). 3. Acute osteitis of a joint (inflammation of the articular end of a bone). 4. Chronic synovitis, with which is usually considered Hydrops articuli. 5. Chronic "joint disease." White swelling. Strumous joint¹ (including both "pulpy degeneration of synovial membrane," and "ulceration of cartilages"). 6. Chronic rheumatic arthritis (rheumatic gout). 7. Acute rheumatism. 8. Gout. 9. Gonorrheal rheumatism. 10. Pyæmic arthritis. 11. Puerperal rheumatism (from 7 to 11 commonly called specific inflammations). Loose cartilage. Ankylosis. Neuralgia of joints. Neuromimetic or hysterical joint. "Of late, great importance has been attached (especially by French surgeons) to speaking, first, of diseases of the synovial membrane, then those of the cartilage, articular capsule, and bone, corresponding to the anatomical conditions. Correct as this division would be if it were only a question of representing the pathological anatomical changes, it is of little use in practice. The surgeon always views inflammation of the joint as a whole, and although he should know which part of the joint suffers most, this is only a part of what he should know ; course, symptoms, and constitutional state equally demand his attention and determine the treatment. Hence the entire clinical appearance will determine the divisions of this, as of many other diseases" (Billroth).

ACUTE SYNOVITIS.—*Causes*.—Usually exposure to cold. Often blows or sprains. Predisposing cause sometimes, *e.g.*, syphilis, rheumatic constitution, etc. But specific inflammations are noticed separately. Joints least

¹ These terms are used often as if quite synonymous. But some surgeons confine the term "strumous" to cases in which they believe the patient is originally of a scrofulous constitution ; some surgeons would discard the term "strumous," altogether ; and some even use clinically such terms as "ulceration of cartilage," just as if such a term described a primary disease.

supplied with a covering of soft parts are most liable. *Signs*.—Pain, heat, and swelling, but not usually redness. Great tenderness. Swelling has a characteristic shape, bulging out exactly where the synovial membrane would tend to pouch when distended. Fluctuation. Tension sometimes great enough to prevent fluctuation. Feverishness. *Pathology*.—Synovial membrane is actively congested, and cavity of joint distended with sero-synovial fluid, usually clear, but occasionally containing a few corpuscles or a little blood. *Prognosis*.—Altogether good, unless constitution be bad or treatment neglected. *Diagnosis*.—Distinguish from acute inflammation of any neighboring bursa. Consider position and shape of swelling and history of case. *Treatment*.—Rest; splint or “fixed apparatus.” Attend to position according to joint affected. Cold. Pressure. Wet bandages. Cotton wool compress and bandage over it. Leeches. Hot fomentations. Dover’s powders internally. For specific cases give specific drugs.

ACUTE SUPPURATION OR ACUTE ABSCESS OF JOINT.—*Causes*.—Sometimes one or more of the causes of ordinary acute synovitis. Sometimes the opening into the joint of an abscess in the neighboring soft tissues or bone. The commonest cause is a wound of the joint. *Signs and Diagnosis*.—Acute pain and swelling; redness and cedema, which may disguise fluctuation. Fixation in some position peculiar to each joint, *e.g.*, flexion and external rotation in case of knee-joint. High fever and rigors. After a time fluctuation appears, not only in the joint, but often also in its neighborhood (secondary abscesses). High fever continues. To distinguish a superficial abscess near a joint from acute articular suppuration, notice that in the former case the symptoms are so localized that some part of the joint will be accessible to examination, and be found healthy. The centre of an extra-articular inflammation will perhaps be noticed to correspond to some bursa, or to some superficial injury. *Prognosis*.—Destruction of joint very probable. Danger to life great in old age, if joint be a large one. Danger of pyæmia. Best result that can usually be expected is ankylosis in good position. Complete recovery from early stage possible. *Pathology*.—In early stage, synovial membrane is red, greatly swollen, puffy and infiltrated with corpuscles and serum. Contents of joints are synovia mixed with more or less pus. In later stage, synovial membrane is red, covered with fibrous rinds, and partly ulcerated; the contents of the joint are thick yellow pus, mixed with fibrous flocculi, the cartilage is breaking down, and even the adjacent cancellous bone inflamed. *Treatment*.—If called to the case early, and there is sufficient reason to believe that the stage of actual abscess and synovial cavity filled with thick pus has not been reached. Anæsthetize patient. Place the joint in a suitable position. Pad both limb and joint freely with cotton-wool. Then apply a fixed apparatus (plaster-of-Paris, or starch and millboard) from near the extremity of the limb to a considerable distance above the joint affected. Be extremely careful to bandage evenly. Place ice-bags over joint. Give

morphia subcutaneously. Elevate limb. Great benefit is often derived from extension by weights. If the case is more advanced, or if it gets worse under the above treatment, and if the evidence of abscess in the joint is unmistakable, the question of opening the joint presents itself. Grooved needle or aspirator may be used to confirm diagnosis. Unless a drainage-tube is used, make free incisions, as Gay recommends. Antiseptic precautions very desirable. Many cases calm down into a chronic state.

ACUTE OSTITIS OF A JOINT.—*Inflammation of the Articular End of a Bone.*—Inflammation of spongy bone-substance adjacent to a joint is very rarely acute; though chronic joint disease frequently begins in the bone. *Causes.*—Obscure, when the affection cannot be traced to injury. *Signs and Pathology.*—Those of OSTITIS, *quod vide*. Pain, heat, and swelling. Redness combined with œdema when suppuration occurs. Synovial membrane of adjacent joint becomes implicated. Effusion into joint. In childhood, whole articular epiphysis may separate. Partial necrosis more probable in adults. *Diagnosis.*—The disease may be known to have begun in the bone by the thickening of that part,¹ and by the history. *Prognosis.*—Danger of acute articular abscess, or in the event of acute inflammation being allayed, of chronic destructive disease of the joint. *Treatment.*—See INFLAMMATION OF BONE. Rest, elevation, cold, painting with iodine, etc. Perhaps occasionally abscess may be prevented from opening into joint by a timely opening from without.

CHRONIC SYNOVITIS. HYDROPS ARTICULI.—*Causes.*—Same as those of acute synovitis, of which affection it is usually a sequel. *Signs.*—Almost always attacks the knee. Young men most liable. Swelling and fluctuation of all the synovial pouches of the joint. Little or no pain or tenderness. The use of the joint is sometimes not much impeded, but it usually causes fatigue and pain. *Diagnosis.*—From white swelling, by the absence of apparent thickening of the articular ends of the bones, of signs of ulceration of cartilage, of the great wasting of the limb which almost always occurs in chronic destructive disease of the joint, but above all by amount of effusion. In early stage age should be considered. Hydrops occurs chiefly in young adults, strumous disease mostly in children. *Prognosis.*—Little or no danger of hydrops articuli leading to any serious joint disease. Relapse after cure very common. *Treatment.*—Perfect rest, counter-irritation, and, above all, compression with the strong elastic bandage. By means of a soft elastic bag containing water and placed beneath the elastic bandage, the pressure can be measured and regulated to a nicety, without removing the bandage. I have found the hydraulic pressure of a column of water twenty-eight inches high sufficient; but this point must vary with the

¹ It is not really the bone itself which is thickened, but the periosteum and soft parts over it.

case.¹ Scott's dressing. Failing these methods, aspiration may be combined with elastic pressure, or tapping with injection of iodine. In case of knee-joint insert a trochar and cannula close to side of patella, draw off fluid, inject tinct. iodi., aquæ, āā 3 ss. Let iodine escape after three to five minutes, according to amount of pain. Now put up limb as after punctured wound of joint. Splint, swing, or starched bandage, etc. Iodine injection is dangerous both to life and limb, and can very rarely be justifiable. Joint may be tapped and drained with antiseptic precautions.

CHRONIC JOINT DISEASE.—*White Swelling. Strumous Disease of Joints.* Including *Pulpy Degeneration of Synovial Membrane*, "*Ulceration of Cartilage*" (and *Articular Ostitis* when it leads to chronic degeneration of the adjacent joint).—To any one more familiar with chronic joint disease in books than in the human body, the above long heading may seem unnecessarily fraught with confusion. But I trust that it is not so; for although some of the above terms represent different conditions at the outbreak of disease and for a short time afterward, yet these different commencements almost always tend toward the same course and termination, viz., implication of every element of the joint, synovial membrane, cartilage, bone-surface, and ligaments. There are numbers of diseased joints which, even when exposed to the eye by excision, amputation, or death, do not reveal the origin of their disorganization. Moreover, in deciding upon a plan of treatment, one considers not so much what was the commencement as what is the present state; not what was, but what is, determines the decision. Still it is true that the consideration of the past may throw light on the future. Moreover, examiners sometimes base their questions on anatomical pathology. Therefore care will be taken in the following notes not to lose sight of anatomical distinctions. *Causes.*—Most cases can be traced to blows or falls, or exposure to cold or wet. Strumous constitution predisposes. As any acute inflammation of a joint may become chronic, so every cause of acute may also be a cause of chronic arthritis, including gonorrhœa and other specific influences. But it is rare for gout, syphilis, or acute rheumatism to lead to destructive inflammation of a joint. *Pathology.*—Commencement may be in synovial membrane (usually after blows, cold, or specific disease), or in ligaments (usually after sprains), or in bone (often in strumous constitutions); but, according to modern pathology, seldom or never in cartilage. When the synovial membrane is affected primarily, the result is Brodie's "pulpy degeneration of synovial membrane." In this disease, parts of the synovial membrane swell, look cedematous, pulpy, reddish-gray, and soft. This condition spreads, eating up, so to speak, the underlying cartilage. The microscopical structure of the pads and tufts of swollen synovial membrane

¹ But to prevent relapse it is necessary to insist upon the patient's wearing a common elastic bandage round his joint for months after leaving hospital.

becomes identical with that of vascular granulations. In the subjacent layer of cartilage which is in process of conversion to the same granulation-tissue, the cartilage cells themselves divide, proliferate, and assist in the dissolution of the matrix of their own cartilage. In this way the pulpy tissue reaches the bone. The process does not stop here, but the bone itself inflames, erodes, and now the joint is carious. In the meantime the ligamentous structures of the joint have been softening, thickening, and, in some places, perhaps, yielding to the encroachments of the pulpy tissue, which may even pierce the skin and present externally as a fungous granulation. At the same time that the synovial outgrowths are destroying the cartilage, destructive inflammation may appear in the articular lamella of the bone, so that the cartilage is attacked both above and below, like a whale between a "thrasher" and a sword-fish. When the disease begins in the ligaments it is usually in the hip or knee joints, which have internal ligaments. From these it spreads to either the synovial membrane or the bone, or to both. Then the features of the case cease to have anything to distinguish them from those of disease originating elsewhere. The frequency with which disease begins in the ligaments is a point not yet settled. Disease beginning in the bone. Ostitis is the commencement of most cases which are genuinely strumous, and of many cases which are not strumous at all. The prime appearances are those of Inflammation of Bone, *quod vide*. Sometimes the joint becomes implicated, because the inflammatory action in the articular lamella spreads to or separates the cartilage. Sometimes necrosis or caries leads to abscess which bursts into joint. The course of events leads to synovitis, which spreads all round the joint, to pulpy thickening of the synovial membrane, and to its usual results, as described above, on both faces of the joint. In rare cases the bone becomes full of soft tuberculous matter. However the disease may begin, if it go on, the ligaments give way, the ends of the bones become displaced, and perhaps necrose wholly or partially. Suppuration and the formation of sinuses often do not occur, especially when the patient, excepting his articular disease, is healthy. The most profuse suppuration occurs in the weakest and most ill-nourished, or else when acute suppurative synovitis becomes chronic. *Symptoms and Course.*—Insidiousness of first stage (unless affection is a sequel of acute disease). In case of joints of lower extremity, limping, occasional complaints of pain or weakness. Surgeon soon detects signs of synovitis, marked much more by thickening of synovial membrane than by effusion into joint. See notices under names of individual joints, *e.g.*, *Hip-joint*. Or the first symptoms observable may be those of articular ostitis (*see* p. 155). The limb assumes a peculiar appearance, distinguished by the swelling and pallor of the diseased joint, and by the wasting of the muscles. The joint assumes a bent position. At a later stage, dislocation takes place. Suppuration may occur at any time, or not at all. Sinuses. Fungous granula-

tions. When bone becomes affected, starting pains at night, excruciating pain on sudden movement or on pressing joint-surfaces together. Sometimes secondary abscesses. Grating may indicate roughness of cartilages. Necrosis may be guessed at from the history or from occurrence of marked crepitus, but can only be certainly known when joint is open. Probe may detect caries when granulations cover the diseased bone. Granulations fungating through a sinus almost always indicate caries. *Prognosis.*—Depends on (1) patient's constitution, (2) his nutritive condition, (3) his command of time and money, (4) the joint affected, (5) the anatomical origin of the disease, (6) the treatment adopted. Where there is also phthisis or kidney-disease the case is almost hopeless. The state of nutrition is the most important. Poor patients sometimes cannot afford to wait till nature cures the disease, and prefer amputation: the surgeon can rarely be justified in acting on this consideration. Moreover, fresh, healthy, highland or sea air is denied to urban poor. Primary osseous disease is of worse prognosis than synovial. *Treatment.*—General and local. *General.*—Indications: (1) to improve nutritive condition, (2) to obtain best possible conditions of fresh air, cheerful light, sound sleep, etc. In many cases general rest, in the sense of total confinement to bed, not desirable. Rather combine general, outdoor, moderate exercise with local rest. But long intervals of repose and gentleness of exercise essential. Cod-liver oil, iron, quinine, milk, etc., according to special features of case. *Local Treatment.*—Indications: (1) perfect rest, (2) one or more of the following remedies: A firm plaster case over a flannel bandage, and extending from some way below to a considerable distance above the joint affected. Instead of plaster-of-Paris, starched bandage and millboard may be used. Scott's dressing, *i.e.*, ung. hydrarg. co., rubbed on joint and then strips of pitch plaster spread on leather applied to it. Gentle uniform pressure with elastic bandage such as "Martin's." Hydraulto-elastic pressure. Extension by weights. Extension by Sayre's splints. Elevation. Suspension in Salter's swing. Continuous cold; ice-bags. Counter-irritation. "Firing." Blisters. When acute exacerbations supervene, a few surgeons recommend leeching. Perfect local rest not always desirable. A certain amount of gentle or of passive exercise, combined with "shampooing" and the elastic bandage, better for some cases (*see Barwell in Practitioner*, vol. xiii., p. 365). At a certain stage arises the question of excision, or of excision *versus* amputation. This is decided by considering (1) the joint affected; (2) state of general health; (3) state of kidneys, lungs, and liver; (4) the stage of the disease; (5) whether operation is required to save life or merely to shorten period of illness and treatment. While excision may frequently be useful in the elbow and hip, and sometimes in the wrist, it can seldom be desirable in the shoulder (except after gunshot wound or compound fracture); and some surgeons *never* excise the knee. *See* articles EXCISION OF JOINT and AMPUTATION. Swabbing out joint with dilute

sulphuric acid (one in three). Operative measures of any kind rarely justifiable until joint is on the point of opening spontaneously. Suppuration and free discharge do not counter-indicate plaster cases. Small windows can be cut in the case. These windows should be really small, *i.e.*, not large enough to spoil the case as a uniformly supporting agent. Sinuses may be slit up and loose pieces of necrosed bone removed.

CHRONIC RHEUMATIC ARTHRITIS—RHEUMATIC GOUT.—*See* RHEUMATISM.

GONORRHOEAL RHEUMATISM.—An affection of the joints occurring in the course of a gonorrhœa. Relation of the two diseases uncertain. The arthritis may be due to blood-poisoning, or to reflex irritation through spinal cord; for it seems that various affections of the genitals will cause inflammations of the joints. *Symptoms*.—It usually attacks knee, hip, wrist, ankles, especially knee. Pain, stiffness, swelling, heat; various degrees of acuteness or of chronicity. Seldom goes on to suppuration and disorganization of joint. Usually confined to synovial membrane and ligamentous structures. *Pathology*.—The appearances of synovitis, ostitis, or abscess are not characteristic of their gonorrhœal origin. *See* above for pathology of Synovitis, etc. *Prognosis*.—Considerable danger of ultimate ankylosis. Often complete recovery. Relapse may occur if gleet return. *Treatment*.—Cure the gonorrhœa or gleet. Make the urethra aseptic (*see* GONORRHOEA). Treat the joint-affection according to the rules given above for the particular form of joint-inflammation each case of gonorrhœal rheumatism may most resemble. When chronic arthritis persists after gonorrhœa is cured, great benefit often derived from an elastic bandage, and ten-grain doses of pot. iod. *ter die*.

NOTE.—The muscular pains often occurring in the course of a gonorrhœa are by some classified as a form of gonorrhœal rheumatism. Cure the cause, and direct flannel to be worn. Chloral may be necessary at night. Change of climate.

LOOSE CARTILAGES.—*Causes*.—1. They grow, like warts, on the synovial membrane, and afterward break off; (2) they are, in rare cases, chipped off the joint cartilage itself. (3) There is also a theory of their formation by a process identical with that of "Quiet Necrosis" (Paget's "Clinical Lectures," p. 343, and Teale). *Symptoms*.—Liability to sudden and sickening attacks of pain, caused by certain movements, and followed by synovial effusion. The loose cartilage may, in many instances, be felt near the superficial aspect of the joint. These symptoms make the *diagnosis* quite clear. *Pathology*.—Number usually single, but sometimes very numerous. Shape rounded or flattened with rounded edges. Size from that of a shot to that of a broad bean, or, in exceptional cases, much larger. Structure rarely cartilaginous, usually fibrous. Joint most commonly affected, the knee. *Treatment*.—1. India-rubber bandage and moderation in exercise of joint, especially restraint from violent motions. Perseverance in this may cause permanent cessation of unpleasant symptoms, perhaps adhesion of

the loose cartilage to a convenient part of the joint. 2. Operative. This must be either subcutaneous or antiseptic. *Subcutaneous excision*.—Fix the cartilage between the finger and thumb; then pass a tenotome through the skin at a distance, and with it divide the capsule of the joint until the cartilage can be squeezed out into the areolar tissue. Fix it there by strapping, etc., and place the limb on a splint, or in a plaster-of-Paris case. A week afterward, if the surgeon choose, he may cut out the cartilage altogether.—*See Square, Medical Times*, vol. ii., 1857.

Joints, Neuromimesis, or Hysteria of.—*Diagnosis* from “organic” disease is based on the facts that, in neuromimesis, (1) the subjective symptoms, pain, tenderness, etc., are often great while there is in the joint no alteration visible to the surgeon at all; (2) the pain and tenderness are often chiefly in the skin rather than in the joint itself; (3) the patient sometimes describes her sufferings in strong language, but in a cheerful manner, as though the recollection of them was not so very painful after all; (4) stiffness and contractions disappear under anæsthetics; (5) instead of being hotter than the healthy joint, as in the case of inflammations, the affected joint is often colder; (6) other hysterical symptoms, and even a manifest cause for them, may coexist. But bear in mind that hysterical patients are not exempt from organic disease, and that “hysteria” itself even sometimes leads to actual alterations in the joints. This is not surprising, considering the intimate relations, pathologically as well as physiologically, between the spinal cord and the joints. *Treatment*.—*See Hysteria*. Refer to Paget’s “Clinical Lectures.”

Kidney, Diseases of.—Frequently complicate, and are produced by bladder and urethra disorders, especially such as obstruct the flow of urine. *Amyloid kidney* is a common result of prolonged suppurations and of syphilis. According to Marcus Beck (his contributions to Erichsen’s “Surgery,” ed. 7, vol. ii., should be carefully read), such diseased conditions of the *ureters and pelvis of the kidneys* are met with in three chief forms, viz.: 1, the results of simple over-distension without acute inflammations; 2, acute inflammation without signs of over-distension; 3, a combination of the two. Simple chronic over-distension leads to dilatations with a certain amount of thickening. The conditions of the kidney are classified as follows: 1, change resulting from pressure by urinary obstruction; 2, acute interstitial inflammation; 3, acute interstitial inflammation with scattered abscesses; the result of former acute and subacute attacks, from which the patient has recovered. 1. *Pressure by Urinary Obstruction* causes dilatation of the kidney, absorption of the pyramids, cellular infiltration of the intertubular tissue (interstitial nephritis), and little or no change in the tubules themselves in the cortex. Capsule tough and adherent. In severe cases even the cortex is almost entirely atrophied, so that the kidney becomes a mere sac. 2. *Acute Diffuse Interstitial Inflammation*.—Kidney soft and swollen; capsule separates readily, but kidney-substance gives way during

the separation. Surface mottled ; section also mottled ; cortex pale, but pyramids much congested. Microscopically, great cellular infiltration between the tubuli. In many parts tubuli are seen compressed or destroyed. Most infiltration around Malpighian bodies. 3. *Acute Interstitial Nephritis with Scattered Abscesses*.—Frequently coincident with acute pyelitis and putrid urine in pelvis of kidney. Kidney shows, in the parts affected, signs of the condition described in the last paragraph (interstitial nephritis), and, in addition, scattered groups of bright yellow spots. These spots are minute abscesses. In certain cases this disease may advance to general supuration of the whole kidney. 4. *Effects of Former Attacks from which the Patient has Recovered*.—These correspond to the changes which result from interstitial inflammations elsewhere. In mild cases complete resolution is possible ; but in more severe ones cicatricial fibroid changes make the kidney contracted and tough, obliterating many of its glandular elements. The capsule is hard to separate ; many small cysts lie beneath it ; the cortex is greatly thinned ; but the pyramids are little altered. *Causes of Interstitial Inflammation*.—1, tension ; 2, reflex irritation ; 3, septic matter in pelvis of kidney. The origin of reflex irritation in these cases is usually some disease in, injury to, or operation on the bladder and prostatic part of the urethra ; but, in Beck's opinion, it is likely that, "in all cases of operation on the urethra, there is a miniature representation of that intense congestion of the kidney which is found in cases of death from suppression of the urine after simple catheterism."

SYMPTOMS OF KIDNEY DISEASE IN SURGICAL AFFECTIONS OF THE GENITO-URINARY ORGANS.—Those of *simple dilatation* of the kidney are few. The most important are increased quantity and diminished specific gravity of the urine. The urine to be examined should be collected for twenty-four hours. *Subacute Interstitial Nephritis* is often obscured by the affection which has led to it, *e.g.*, by vesical catarrh. But even in such circumstances a dry tongue, persistent nocturnal rises of temperature (rarely to above 101° F.), emaciation, and occasional nausea, are ominous symptoms. Urine copious ; its specific gravity usually low.

Acute Interstitial Nephritis with Scattered Abscesses.—Begins with rigor and rise of temperature to 105° or 106° F. This may be repeated again and again. Tongue like broiled ham. Sordes. Nausea, vomiting. Rapid emaciation. Possibly diarrhoea. So called "typhoid" symptoms. Tenderness over kidneys. Muttering delirium. Patient sinks ; but the profound coma and convulsions of uræmic poisoning are exceptional. "The urine varies much. It usually becomes more or less bloody, and in rare cases is suppressed, though much more frequently a considerable quantity is passed up to the time of death." Much decomposed and mixed with mucus, pus, and blood. *Diagnosis* has to be made from (1) pyæmia, (2) peritonitis, (3) typhoid fever, (4) ague. "From pyæmia the diagnosis is somewhat difficult, the most important point being the vomiting, the

absence of secondary abscesses, the drowsy state into which the patient soon falls, and the fact that the temperature often remains, for days before death, below normal." The kind of vomiting and the course of temperature contrast with those of peritonitis. The temperature curves and the absence of spots distinguish from typhoid. In ague there should be complete intermissions. *Prognosis*.—In acute cases of "surgical kidney" always bad, but most so in suppurative nephritis. *Treatment* of kidney-disease complicating surgical cases.—Rest. Avoid every source of genito-urinary irritation. If catheterism is unavoidable, use soft instruments, thoroughly cleansed, oiled, and antiseptic. Treat the causes with mild and gentle means. For interstitial nephritis, dry-cup the loins, give purgatives, dress in flannel, stimulate the skin, *e.g.*, by hot-air baths. Shun surgical operations.

Knock-knee (Genu valgum).—A deformity in which the knee is bent inward. *Causes*.—Rickets; muscular weakness, combined with habits of excessive standing, or of carrying heavy burdens; lazy manner of walking and standing. About puberty a disease is liable to attack the epiphyseal cartilages, somewhat analogous to the rachitis of childhood. These cartilages are then peculiarly liable to give way from the causes above mentioned. Hence many cases of genu valgum, and even spinal curvature. (See Mikulicz in v. Langenbeck's *Archiv*, xxiii., 3 to 4; and also Busch: "Die Belastungsdeformitäten der Gelenke," Berlin, 1880.) *Anatomy*.—The diaphyses of the femur and tibia grow faster on the inner than on the outer side. Thus, the internal condyle is pushed downward, and the inner part of the upper epiphysis of the tibia upward. At the same time the diaphyses often grow curved, with the convexity inward. The patella tends outward toward the external condyle. The internal lateral ligament is relaxed in cases which commence at or near puberty, but not in the knock-knee of rachitic children. *Treatment*.—In early age, the most severe cases can usually be cured by judicious and persevering use of splints or irons, and elastic force, combined with tonic medicines and hygiene. But some plan of osteotomy has to be followed when the bones are hard.¹ Such operations are (1) Ogston's, (2) Chiene's, (3) McEwen's, (4) Reeves's, on the femur, and (5) Barwell's, on femur, tibia, and fibula. M. Deloré forcibly bends the knee straight during anaesthesia, and then secures it in a movable dressing. He says that this procedure separates the inferior epiphysis of the femur. Dr. Ogston makes a small incision through the skin and saws off the internal condyle subcutaneously, and then easily brings the limb straight. McEwen chisels nearly through the femur above the condyles, and then puts the limb straight. This is a very satisfactory

¹ It is difficult to give any concise and precise rules or indications for osteotomy in genu valgum. In each case the age of the patient, the amount of the deformity, its duration, its cause, its precise anatomical nature, and the effect upon it of experimental splinting, have to be considered.

operation. Use antiseptics. Chiene's and Reeves's modes of operation differ from Ogston's in that the former removes a wedge of bone and therefore alters the joint-surface less, while the latter chisels up to, but not through, the articular cartilage. Chiene uses the chisel. (*See OSTEOTOMY in Appendix.*)

Labia.—The external genital organs of the female are liable to (1) hypertrophy, (2) cystic tumors, (3) venereal diseases, especially warts and ulcers, (4) epithelioma, (5) hæmatocele, (6) varix, (7) abscess, besides other affections of less frequent occurrence. Affections of the labia are modified by (1) the vaginal and vesical discharges to which they are so often exposed; (2) the hindrance to the circulation due to the dependent position of relaxed or hypertrophied labia; (3) the dirty habits of some patients. In treating them, beware of severe parenchymatous hemorrhage. (*See article HEMORRHAGE.*)

Cysts of the labia are particularly frequent in young women, especially shortly after marriage. They are commonly caused by hypertrophy of the follicles of Cowper's glands. Lay them freely open and insert lint in the cavity.

Hypertrophy of the labia or of the *clitoris* usually originates in venereal inflammation, but persists after the cause is removed. *Treatment.*—Excision. Acupressure may be used to repress troublesome hemorrhage.

Congenital Cohesion of the Labia.—Easily remedied by tearing with the handle of a scalpel. Oil the surfaces well, and instruct the nurse to keep them separate with a piece of oiled lint for a few days.

Larynx, Diseases of.—Acute catarrh (acute laryngitis). Chronic catarrh (including clergyman's sore-throat). Œdema glottidis, syphilitic affections, phthisis, cancer, inflammation and necrosis of cartilages, tumors, foreign bodies, "nervous" disorders (including laryngismus stridulus).

LARYNX, ACUTE CATARRH OF—ACUTE LARYNGITIS.—*Causes.*—Cold, cold with damp; excessive shouting, speaking, or singing; erysipelas spreading inward to larynx. Mechanical and chemical irritants. Scalds. Acute exacerbations sometimes supervene in cases of chronic catarrh. A larynx diseased from any cause is more liable to acute inflammation than a sound organ. Spread of a naso-pharyngeal catarrh to larynx. Influenza. Exanthemata, *e.g.*, measles, small-pox, typhoid. *Symptoms.*—Functional derangements, *viz.*, loss of voice or hoarseness. Pain in throat near hyoid bone, perhaps tenderness in that region when swallowing. Tickling in throat. Hacking cough. At first scanty, tenacious sputa, afterward looser and more purulent. If the case progresses unfavorably, dyspnoea comes on, and this is liable to sudden and most dangerous increase, during which tracheotomy or laryngotomy may be necessary to prevent asphyxia. The local symptoms are usually much more serious than the general. But more or less fever is present. *Pathology.*—Whole mucous tract of larynx is not always affected. The appearances are like those of mucous catarrhs

elsewhere, *i.e.*, swelling, redness, mucous, purulent, or sero-purulent exudation ; occasionally, in severe cases, small submucous hemorrhages. The dyspnœa mentioned above, when sudden, is partly or wholly spasmodic. But the most dangerous kind results from great serous effusion in the submucous tissue of the glottis, "*œdema glottidis*." After death the appearances are much less marked than when shown by the laryngoscope during life. *Diagnosis*.—Hoarseness, and occasionally dyspnœa, indicate larynx as the seat of affection. Laryngoscope will exhibit actual state of organ. Catarrhal laryngitis differs from croup in that, 1, the dyspnœa is not persistent, and varies more ; 2, there is no false membrane ; 3, there is usually less fever ; 4, a known cause and history may point unmistakably to acute non-croupous laryngitis. *Prognosis*.—Very guarded, danger of sudden and fatal dyspnœa. Laryngotomy and tracheotomy, while they avert this danger, introduce others, such as pulmonary congestion. Recovery usually complete, but acute sometimes passes into chronic catarrh. *Treatment*.—Rest in a room of uniform and warm temperature. Atmosphere charged with steam. Hot moist sponge to throat. Low diet. Milk and soda-water. Avoid greasy food. Salt food and saline drinks beneficial. Emetics : ipecacuanha, tartar emetic. Aconite (*see* Ringer's "Therapeutics," p. 399). Diaphoretics. Purgatives. Forbid attempts to speak or whisper. If, in spite of treatment, dangerous dyspnœa should come on, perform tracheotomy. (For *œdema Glottidis*, *see* p. 165.)

LARYNX, CHRONIC CATARRH OF—CHRONIC LARYNGITIS—CLERGYMAN'S SORE-THROAT.—*Causes*.—Same as those of acute catarrh. But, in order to produce the chronic affection, they have to be applied in a milder form, and more persistently or repeatedly. In addition to these, alcoholism, syphilis, phthisis, and occupations in which the voice is frequently strained, predispose to the affection. So also does a low tone of the nervous and vascular systems. Damp, cold climates. Herpetic diathesis. *Symptoms*.—Hoarseness ; weakness of voice ; voice also loses its firmness and becomes uncertain, especially in the higher notes. Liability to intercurrent attacks of acute laryngeal catarrh. Catarrh usually affects also the neighboring mucous tract of the pharynx. Direct observation of the pharynx with the unassisted eye, and of the larynx with the laryngoscope, shows the mucous glands enlarged, a dusky, congested mucous membrane, small varicose veins, and a glairy, mucous secretion clinging to parts of the region. A troublesome, tickling cough sometimes. Almost always a habit of clearing, or rather of attempting to clear the throat by hawking. Thirst. Frequently a hypochondriacal state which exaggerates the subjective symptoms. Often symptoms pointing to the cause of the chronic laryngitis, *e.g.*, signs of alcoholism. *Pathology*.—Inflammatory congestion and eventually thickening of the submucous tissue. Hypertrophy of the mucous glands. A glairy mucous or muco-purulent secretion clinging to the mucous membrane. Rarely ulceration, unless the disease has a specific cause.

Varicosities of the small vessels. *Diagnosis*.—Compare symptoms with those of specific diseases of, and with those of ulcers and of growths in, larynx. *Prognosis*.—Only good when the causes can be removed or a change of climate can be obtained, or local treatment persistently carried out for a long period by skilled hands. *Treatment*.—Rest from irregular or much speaking or singing. All the ordinary precautions against catarrh, viz.:—good thick boots, warm socks, dry clothes, dry lodging, dry climate if possible. Exercise in fresh air without thick covering on throat, but merely a thin tie or handkerchief. Regular habits. Avoid night air. Open bowels. Moderate diet. No stimulants. In a few cases generous diet is beneficial. Gargling with hot (not lukewarm) saline solutions, especially of chlorate of potash; sponging pharynx and glottis with sol. argent. nit. (gr. xx. to $\frac{5}{2}$ j.). Inhalations of medicated sprays (especially argent. nit., gr. j.—x. to $\frac{5}{2}$ j.), or of chloride of ammonium vapor. Painting pharynx with glycerine of tannic acid. The health of the other organs and systems of the body should always be inquired into carefully and attended to. Chloride of ammonium, belladonna, mercury, sulphur, ipecacuanha, antimony, iodide of potassium, are all sometimes beneficial.

ŒDEMA GLOTTIDIS.—*Causes*.—Usually some ulceration or deeper affection of the larynx than mere non-specific catarrh, e.g., syphilitic disease of the cartilages, small-pox. Sometimes erysipelas spreading inward from face. Scalds. The œdema often supervenes quite suddenly in the course of such diseases. *Signs*.—Firstly, there are the symptoms of the original disease, e.g., hoarseness, loss of voice, cough; then gradually or quickly, signifying the occurrence of “œdema,” there appears great dyspnoea, almost entirely inspiratory. This assumes a fearful form; and the patient’s attitude and expression, as he exerts every muscle to get breath and avoid the strangulation which appears to him imminent, are never to be forgotten. *Diagnosis*.—From croup. The latter occurs in children, but œdema glottidis almost always in adults. On pushing the finger boldly into the pharynx, and feeling behind the back of the tongue, the epiglottis and ary-tæno-epiglottidean folds may be felt; the former as a median pear-shaped swelling, and the latter as two lateral elastic swollen rolls of distended membrane. In the cases where the œdema is unilateral, of course a swelling will only be felt on one side. The swollen epiglottis is sometimes visible. *Pathology*.—The œdema results from what is called collateral fluxion, that is, from the active congestion which is apt to take place near a centre of inflammation, especially an ulcer. Niemeyer aptly draws attention to its analogy with œdema of the prepuce complicating a chancre. The swellings may be pale or red, according to whether effusion or hyperæmia predominates. *Treatment*.—Scarify with a bistoury wrapped round all but the point by lint or strapping. If the case is not urgent, croton oil may be given; and an emetic when there are many moist râles indicating bronchial and pulmonary congestion. Warmth to the extremities. Pa-

tient should swallow slowly small bits of ice. Whether the symptoms are urgent or not, he should be carefully watched and surgical assistance be at hand ; for tracheotomy may be required very suddenly to save from instant suffocation. When the above plan of treatment does not arrest the disease, perform tracheotomy. The prognosis after operation is hopeful. (*See also treatment of ACUTE LARYNGITIS.*)

LARYNX, SYPHILITIC AFFECTIONS OF. — *Varieties.* — (A) secondary affections — erythema, condylomata, ulcers ; (B) tertiary affections — “papulo-tubercular elevations,” ulcers, gummata, perichondritis, necrosis of cartilages. *Secondary* affections may be suspected from the altered voice, combined with secondary eruptions elsewhere, especially in the fauces. They can be seen with the aid of the laryngoscope, and require ordinary constitutional anti-syphilitic *treatment*, aided in some cases by such local treatment as inhalations of calomel vapor, sprays of chloride of ammonium and corrosive sublimate, or applications of nitrate of silver. Fatigue of the voice should be avoided. *Tertiary* affections of the larynx are more destructive and dangerous. The papulo-tubercles affect any part of the laryngeal mucous membrane, and, though occasionally causing dyspnoea, chiefly signify their presence by affecting the voice.

TERTIARY ULCERS of the larynx begin either superficially, or from softened gummata, or from perichondritis. Usually multiple ; generally first attack epiglottis. Spread in any or every direction, destroy vocal cords, necrose cartilages. Cause dangerous and suffocative spasms. *Symptoms.* — Hoarseness or loss of voice ; in many cases attacks of dyspnoea ; coincident syphilitic history, and, usually, syphilitic appearance. Swallowing sometimes difficult from tendency of fluids to pass through glottis. *Prognosis.* — In favorable cases, cicatrization takes place ; but, even then, voice remains impaired, and a stricture of larynx may result, seriously impeding respiration. So long as disease is active there is great danger of sudden and fatal spasm. *Diagnosis* has to be made chiefly from phthisis and epithelioma. *Treatment.* — Where there is dyspnoea which cannot be rapidly removed by milder means, it is dangerous to delay laryngotomy or tracheotomy. Usually the former operation is to be preferred. Iodide of potassium (grs. x. to xx. *ter die*) must be given ; cod-liver oil, tonics, best hygienic conditions which can be obtained, are indicated. Locally, astringent, stimulant, and mercurial applications may be made with the aid of the laryngoscope, *e.g.*, strong solutions of sulphate of copper. McEwen has lately (in *British Medical Journal* for July 24 and 31, 1880) demonstrated that tracheal tubes introduced through the mouth may be used as a substitute for tracheotomy or laryngotomy in cases both of disease and of operation. Laryngeal strictures have been treated by the passage of metallic and vulcanite instruments (Trendelenburg and Schrötter).

TERTIARY ULCER.	PHTHISICAL ULCERATION.	EPITHELIOMA.
1. Attacks epiglottis first.	Attacks first near arytenoid cartilages.	Usually commences over pharyngeal aspect of arytenoids.
2. Progresses rapidly.	Does not advance rapidly.	Progress slow.
3. Little thickening.	Great thickening.	Irregular thickening.
4.	Granular appearance of posterior surface of epiglottis.	
5. Expectoration thick, tenacious, yellowish.	Expectoration frothy, thin, muco-purulent.	At first thin, often bloody.

LARYNGEAL PHTHISIS.—*Vide* medical works or special treatises. The diagnosis mainly rests on the coexistence of pulmonary disease and of hectic fever, on the absence of specific disease, such as syphilis, and on the laryngoscopic appearances. The latter may show ulcerations, especially at the back of the epiglottis and near the arytenoid cartilages. The disease is tuberculous; though it may be the result of local infection by phthysical sputa passing over laryngeal mucous membrane. Treatment is addressed locally to the ulcerations and *chronic laryngeal catarrh* (*vide* above), and generally to the phthisis.

LARYNX, CANCER OF.¹—Affects chiefly male sex, and almost always occurs in late middle life. Begins usually on left side. Primary cancer is about as often encephaloid as epithelioma, seldom or never schirrus. The *diagnosis* has to be made from laryngeal phthisis and from syphilis. Phthisis causes earlier and more complete loss of voice. Before there is much evident new growth it is next to impossible to distinguish laryngeal cancer from syphilis. There are symptoms analogous to those of cancer elsewhere, viz. :—pain, offensive odor, hemorrhages, glandular enlargements. *Treatment*.—While the diagnosis is at all doubtful give anti-syphilitic remedies. Afterward, morphia subcutaneously for pain, carbolic acid inhalations for fetor, atomized solutions of tannin for hemorrhages. But, above all, tracheotomy, which in Fauvel's cases prolonged life, on the average, two years in epithelioma and nine months in encephaloid. *See* treatment of CANCER. The results of operation of extirpation of larynx have not yet been encouraging.

LARYNGEAL CARTILAGES, PERICHONDRITIS AND NECROSIS OF.—*Causes*.—"Catching cold," syphilis, exanthemata. Indirectly, any cause of laryngeal ulceration; for perichondritis may supervene on ulcer of larynx. Patients are usually in a cachectic state. *Signs, etc.*—Firstly those of inflammation: pain very great.—Then suppuration: collection of pus may cause intense dyspnoea. Lastly, necrosis of cartilage, which varies from very trifling extent to the loss of whole cartilages. Portions of cartilage are coughed up. Sinuses may form in neck. Cricoid cartilage most fre-

¹ See especially: Fauvel's *Traité Pratique des Maladies du Larynx*. Paris: Delahaye; and a review of the same work in *Medical Record*, vol. iv., p. 476.

quently affected. The immediate cause of the necrosis is usually separation of inflamed perichondrium rather than inflammation of cartilage itself. *Diagnosis*.—Easy when necrosis, with abscess or sinus, is fully advanced. But earlier stages are accompanied by signs of laryngeal irritation, which may resemble those caused by a foreign body. Use laryngoscope and consider history of case. *Treatment*.—On general principles. Open abscess. Perform tracheotomy if dyspnoea is urgent and dangerous. Treat syphilis if present.

LARYNX, INNOCENT TUMORS OF.—*Varieties*.—Fibrous and fibro-sarcomatous polypi, adenomata, papillomata, mucous cysts. Fibrous polypi and papillomata are the most common. Other varieties, such as lipomata, occur with extreme rarity. Cancerous tumors are described elsewhere. *Position*.—Very rarely on the posterior wall (where ulcers are very frequent). *Signs*.—Dyspnoea when the tumor is large enough or so situated as to be liable to get between the vocal cords. When the tumor is above the glottis inspiration is most likely to be obstructed, when below the glottis the dyspnoea may be expiratory. Sensation as if foreign body were in larynx. Sometimes secondary laryngeal catarrh: cough, hoarseness, aphonia. *Diagnosis*.—Use laryngoscope. *Treatment*.—Removal through the mouth in most cases. Sometimes the larynx has to be opened from the neck, by median division of the thyroid cartilage for instance. In removing through the mouth, snares, écraseurs, laryngeal forceps, guillotines, and even galvanic cautery are used. Of course the parts have to be made visible by laryngoscope during operation, and no small skill is usually required. See special notice of LARYNGOSCOPY. Puncture cysts. Tracheotomy is done prior to thyrotomy, and may be required, in case of severe dyspnoea from tumor, merely to avert immediate danger of life.

LARYNX (TRACHEA OR BRONCHI), FOREIGN BODIES IN.—*How They Gain Entrance*.—Through glottis, or, very rarely, through a wound. Children most liable, from practice of playing with things in their mouths. Laughing or coughing whilst swallowing: the deep inspirations taken in those actions suddenly draw food into the air-passages. Syphilitic ulceration may impair laryngeal orifice or sphincters. General palsy of the muscles which close the glottis. Palsy of the vocal cords is not in itself enough to cause any danger of entrance of foreign body. *Parts Where They Lodge*.—Sharp bodies usually stick in larynx, especially in or near the ventricle, or just above the glottis. Of course, only bodies of limited size can pass through glottis. Small, smooth, rounded bodies most likely to drop into trachea or bronchi, especially into right bronchus. Septum between bronchi is to left of middle line. Right bronchus is larger than left. *Signs*.—Depend (1) upon size of body, (2) upon its position, (3) upon whether it is impacted or not, (4) upon its nature, whether sharp and jagged or smooth and rounded. 1. A sufficiently large substance will cause speedy suffocation unless removed. 2. Bodies near the glottis

usually cause acute irritation, spasm, cough, and choking sensation ; perhaps hemorrhage and pain. Symptoms may be aggravated by each act of swallowing. If not removed, ulceration, catarrh, or even abscess will ensue. Impaction in the trachea causes signs mainly of impeded respiration, but also produces general laryngo-tracheal irritation, and, eventually, inflammation and ulceration. The interference with respiration, as well as the tracheitis, soon affects the lungs. Bronchitis and pneumonia. When a bronchus is the locality, the signs resemble those of foreign body in the trachea ; but the pulmonary symptoms are confined to or most marked in one lung. There is decrease or absence of respiratory murmur on the affected side. 3. Bodies lying loose in the air-passages are apt, as they from time to time come in contact with the glottis, to cause sudden and violent paroxysms of choking and dyspnoea. 4. Of course, sharp and jagged bodies produce greater irritation, and cause far greater danger of ulceration, etc., than smooth ones. *Diagnosis*.—The history generally makes this clear. Laryngoscope is very valuable. Lay stress upon the sudden access of the symptoms without warning, and on the absence of fever. Of course, when inflammation has resulted, fever will be present. *Prognosis*.—Most grave, unless the body can be removed. The instances in which substances have remained without producing serious consequences are very rare. Sooner or later disease of the lungs ensues and proves fatal. *Treatment*.—Measures must be taken to remove the foreign body. In some cases the finger suffices to hook away an obstruction partly within and partly without the larynx. In adults, the laryngoscope will sometimes enable forceps, hooks, or loops to be used successfully ; and, in children, inversion of the body (applied by Mr. Brunel to himself) should be tried, aided by succussion and by slapping the back. The remaining proceeding is tracheotomy. And, when employing inversion, succussion, etc., the surgeon should always be prepared to do tracheotomy at a moment's notice. If the foreign body is in the trachea or bronchi, do tracheotomy low down. If the foreign body be in the larynx, and cannot otherwise be extracted, the tracheal wound may be extended upward, even through the thyroid cartilage itself. If, when the wound has been made, extraction cannot, even with the help of inversion and succussion, be effected, the wound must be kept open in the hope that the patient may shortly cough out the body. And a cannula must not be worn unless the foreign body is known to be above the wound.

RULES FOR LARYNGOSCOPY.¹—1. *Position of patient* : sitting, body and head erect, knees together, head slightly thrown back. 2. *Lamp* : in line with patient's ear, nine inches to left of his head. 3. *Position of surgeon* : opposite patient, with mirror properly adjusted to head and eye. 4. *Mouth* : wide open, 5. Reflect light upon fauces at correct focal distance

¹ Abbreviated from Lennox Browne.

of reflector. 6. Warm laryngeal mirror over lamp. Test it against cheek or hand. 7. Direct patient to protrude his tongue. 8. Hold it between thumb and index-finger, in napkin (thumb uppermost). 9. Hold laryngeal mirror like a pen. 10. Place its back gently against uvula. 11. Move your hand slightly toward patient's left, so as to keep it out of line of view. 12. Patient to draw a deep breath, and say "ah," "ur," "eh," or "ee." Be always quiet and gentle; encourage the patient; let each examination be short, even if unsuccessful. Be careful not to hurt patient's tongue, or to burn his mouth, or to push either his uvula or the mirror against the back of the pharynx.

LARYNGOTOMY.—Steady larynx between thumb and forefinger of left hand. Make a perpendicular incision through skin and fascia over crico-thyroid membrane, and one inch long. Pass a sharp scalpel through crico-thyroid membrane transversely. In the absence of a cannula (*e.g.*, in operations done with a penknife to prevent choking), turn the blade on edge to hold open the wound. In operations done deliberately, of course some tube must be introduced. *See* TRACHEOTOMY. Tie any bleeding vessel as soon as it is divided.

Lips are liable to congenital deformities (*vide* HARE-LIP), to fissures, chancres, epitheliomata, cysts, nævi, wounds, carbuncles, etc. *See* general articles, *e. g.*, TUMOR, CYSTIC, etc.

FISSURE OF LIP.—Often syphilitic. Avoid laughing. Touch with argent. nit.; afterward use weak ung. hyd. nit., cold cream, etc. Antisyphilitic remedies if necessary. Make a shallow cut through base in obstinate cases.

CARBUNCLE OF LIP is singularly fatal. *See* CARBUNCLE.

Litholapaxy (or LITHOTRITY, with immediate evacuation).—Professor Bigelow, considering that the practice of leaving sharp fragments in the bladder for weeks was more hurtful than the prolonged use of the lithotrite, evacuating catheter and bottle; being struck, moreover, by Otis' emphatic announcements of the great calibre of the urethra—developed this operation. He uses a special lithotrite, an evacuating catheter of a size, if possible, of No. 30 (French), and an aspirating siphon, which stands on a table and communicates with the evacuating catheter by an india-rubber tube. Ether is given, and the sitting may be prolonged for an hour. There are many details to be attended to. *Vide* a Paper by Bigelow, in "Clinical Society's Transactions," vol. xii., 1879. Facts so far indicate an excellent future for this operation. *See also* observations by Sir H. Thompson and Mr. Cadge at the meeting of the British Medical Association, Cambridge, 1880.

Lithotomy.—*Definition.*—An operation in which the bladder is cut into for the extraction of a calculus. *Varieties.*—Two kinds, viz., suprapubic and perineal (vaginal in the female). Varieties of perineal lithotomy, viz., (1) lateral, (2) median, (3) bilateral, (4) medio-lateral. Bilat-

eral lithotomy is so rarely employed that we must refer to larger works for a description of it.

LATERAL LITHOTOMY (by far the commonest operation).—*Instruments*.—"Staff," grooved on side or on convexity, lithotomy knife, lithotomy forceps, scoop, bandages or straps to fix ankles and wrists, large metal syringe, sponges, towels, catheter and lint for plugging wound if it should be required. Stool or low chair for operator. Pocket case; anaesthesia; razor and oil to shave perineum. Operation: place patient in lithotomy position, bandaged or strapped (or the legs may be held in position by two assistants). Buttocks to be well over end of table. The stone should be detected whilst the patient is on the table, or else the operation should be postponed. The surgeon sits at a convenient height, with his instruments on a table close by, and an assistant to hand them (the latter should be instructed as to the size and kind of forceps required, etc.). The surgeon passes the staff, and gives its handle to an assistant on the patient's left. This assistant keeps the handle of the staff perpendicular, grasping it firmly, but with the thumb upright. He should keep the concavity of the staff pressed up against the symphysis pubis. Surgeon now incises skin and fat from a point in median raphe one inch and a half in front of anus, outward and backward, to midway between anus and tuberosity of ischium. Incision may be extended backward in ischio-rectal region if necessary. Deepen incision until the groove in the staff can be felt with the tip of the left forefinger. Using the same finger and its nail as a guide, send the point of the knife into the groove in the staff—of course opening the urethra. Next glide the knife along the groove till it reaches the bladder. The passage of the knife into the bladder is recognized by the disappearance of the sense of resistance which is felt when the prostate is being cut, and perhaps, also, by the escape of urine.¹ As the knife glides along the groove, its handle should be depressed, so that the *point* of the knife may *never leave the groove till it fairly enters the bladder*. A neglect of this precaution may result in the knife getting between the bladder and the rectum. Withdraw the knife, "lateralizing" it and deepening the incision in the prostate during withdrawal. In case of a large stone, knife may, during withdrawal, be moved out of groove of staff a little to deepen incision. Insinuate left forefinger into bladder, and, as soon as you are *perfectly sure* that your finger is in the bladder, withdraw the staff, *but not before*. Take the forceps with your right hand and pass them into bladder, along dorsum of left index-finger. When they have reached bladder, open them, and, very likely, the gush of urine which usually now takes place will wash the stone into the grasp of the forceps. If this should not happen, care must be taken in seizing the calculus not to include any vesical mucous membrane, and the calculus

¹ See notice of Gritti's operation, in Appendix.

should be so grasped that its long diameter may be in a line with the axis of the forceps. In extracting stone, forceps should be pulled in a downward and backward direction, and with a twisting movement. When wound is very deep, blunt gorget may guide forceps into bladder better than index-finger. When calculus is large, finger may be used to dilate incision of prostate and neck of bladder, or a blunt-pointed bistoury may be used to deepen prostatic incision. Sometimes stone can be more easily extracted between forefinger and scoop than by forceps or by finger alone. If stone breaks up, use of scoop and of syringe will be required. If stone is very large, surgeon may have to purposely break it with a strong lithotrite, and extract it piecemeal. When the last-mentioned proceeding has to be resorted to, the prognosis is not very hopeful, not so much from the measure itself as from the state of things for which it has been required. The bladder is now carefully explored for another calculus or for *débris*. In case of hemorrhage, use a plug made like an umbrella, *i.e.*, a piece of catheter with lint or linen tied round it toward one end. This end is passed into bladder, and lint or wadding pushed into the wound between the lint and the catheter. The whole can afterward be withdrawn by pulling at the lint. Tie the legs together, and send patient back to bed. The dangers and accidents of lithotomy are (1) hemorrhage, (2) wounding rectum, (3) missing the bladder with the knife, (4) leaving a calculus or a piece of calculus in bladder, (5) pelvic cellulitis, (6) peritonitis, (7) cystitis, (8) erysipelas, pyæmia, and other accidents common to wounds in general. Any of the above complications may be fatal. But the great *cause of death* after lithotomy is pre-existing *kidney disease*. *After-treatment*.—Merely rest, warmth, cleanliness, and careful observation. Oil buttocks and thighs while urine continues to flow through wound.

MEDIAN LITHOTOMY.—Allarton's form of the operation: 1, pass a grooved staff into bladder; 2, place left forefinger in rectum; 3, feel with the same finger for the apex of the prostate; 4, enter a straight knife half an inch in front of anus and direct its point to the urethra, just in front of apex of prostate; 5, with this knife cut upward a little, dividing small portion of urethra; 6, pass a probe-pointed director into the bladder, and withdraw the staff; 7, gently insinuate finger along this director and dilate (or tear?) prostate with the finger; 8, extract the stone with forceps. This operation is adapted for extraction of foreign bodies.

Several operators, including Buchanan and Teevan, use a rectangular staff when performing lithotomy. At Guy's a "straight" staff is used. N. R. Smith's ingenious apparatus is figured in Erichsen's "Surgery," ed. vii., p. 778. For *Bilateral* and *Medio-bilateral Lithotomy*, see large works.

SUPRA-PUBIC LITHOTOMY, or "high" operation.—Instruments: scalpel, artery forceps, dissecting forceps, curved staff, or metal catheter, retractors, lithotomy forceps. 1. Incise skin in middle line from pubes upward, for three inches. 2. Dissect carefully downward and backward to reach

bladder (which should contain several ounces of fluid), pushing away the peritoneum if necessary, and keeping near the back of the pubes. 3. Depress handle of staff which is in the bladder, so as to raise its point; and open bladder by cutting down on this point. 4. Enlarge incision in bladder toward its neck. 5. Extract with lithotomy forceps. Chief dangers are from peritonitis and urinary infiltration, and they are immensely increased by the bad state of the kidneys, usually found when the calculus is large, and consequently when the supra-pubic operation is done. A soft catheter should be left in the urethra till the wound becomes fistulous. The supra-pubic operation can be done antiseptically.

Lithotrity.—Operation by which a calculus is crushed in the bladder and the fragments afterward extracted through the urethra.¹ *Circumstances under which Suitable.*—When (1) age is fifteen or upward, (2) stone is less than one inch in diameter (if the other conditions are favorable this limit may be considerably exceeded), (3) it is of soft or friable material, *e.g.*, phosphates, (4) urethra is healthy, (5) bladder and kidneys are healthy, (6) prostate is normal. A combination of the above conditions should make success certain. Noticing each individually, it may be observed that lithotomy is safer when the age is under fifteen, when the bladder and kidneys are diseased and the stone large or the stones numerous, when the urethra is narrowed by a stricture and the bladder at the same time not very healthy, and when the prostate is so enlarged as to make manipulation of the lithotrite or removal of the fragments difficult. But there are many cases in which the reasons for or against lithotomy or lithotrity are very nicely balanced. The main considerations are, undoubtedly, age of patient and health of genito-urinary organs. A practised lithotritist is justified in crushing where a less experienced surgeon ought to cut. *Operation.*—Instruments: lithotrite, Clover's syringe, linen cloth on which to wipe lithotrite, oil, basin of water to receive fragments, warm water to inject if required. *Preparation.*—Rest and treatment of vesical irritability, if present, for a short time before day of operation. Bowels to be cleared. Bladder should contain four or five ounces of urine or warm water. Recumbent position. Pillow beneath buttocks. Blankets to keep trunk warm. Warm and oil lithotrite and pass it well into bladder. Be extremely gentle throughout sitting. Seize stone by one of two methods: *I. Civiale's.*—In this the calculus is picked up by the lithotrite, just as a bird picks up a pebble with its beak. The following rules are usually followed: *I.* In the case of small or medium-sized stone, (1) pass the lithotrite, closed, to the back of the bladder; (2) if the lithotrite has touched or is touching the stone, rotate it slightly away from the stone and withdraw the male blade; rotate it back again to a little beyond its

¹ Professor Dolbeau's "perineal lithotrity" is outside the above definition. His operation is really a combination of lithotrity and lithotomy.

original vertical position, and close the blades. The stone will probably be caught; (3) in any other case proceed to find and seize the calculus systematically, thus: 1, withdraw the male blade, then half rotate (45°) the lithotrite to the right, thus / and close; 2, withdraw the male blade again, then half rotate to the left, \, and close; 3, rotate (90°) to the left horizontal, and close; 4, rotate to the right horizontal. In each case withdraw male blade before rotation, and also depress handle of lithotrite half an inch, so as to slightly tilt up its blades; 5, 6, search the sides of the floor of the bladder by a still further rotation (135°), first to right, then to left—before doing this depress handle of lithotrite one inch and a half; 7, having opened the blades, turn them to the inverted perpendicular and close, at the same time depressing handle still farther. In this way the lithotrite searches all round its own axis at intervals of 45° , and cannot well miss anything. Every movement is to be conducted with extreme gentleness, and, in particular, the centre of motion, when the instrument is moved at all, should be the prostatic part of the urethra, where serious results would be most likely to follow injury inflicted by rough manipulation. Small stones usually lie toward the back of the trigone. II. In the case of a large stone, rotate away the blades to open them, as in the cases previously noticed; but do not open the lithotrite by pulling back the male blade; open it by pushing forward the female blade, leaving the male at the neck of the bladder; then rotate toward the stone and seize. *II. English Mode of Seizing Stone.*—The handle of the lithotrite is raised so as to depress its blades against the base of the bladder. The male blade is then withdrawn, the handle being simultaneously raised a little more. If the calculus does not then fall between the blades, tap the lithotrite lightly in front or on one side, so as to try by the slight concussion to dislodge the calculus. This failing, the blades may be rotated slightly, first to one side, and then, if necessary, to the other.

The stone being seized, rotate the lithotrite a fourth of a turn on its axis before crushing, so as to find if any mucous membrane has been accidentally trapped. Work always as near the middle of the bladder as possible, and always over the same spot. On this spot the fragments will fall, and from it they can be picked up and further crushed, if necessary. No sitting should last more than five minutes.¹ If pain is produced, the sitting should be cut short. Sometimes one sitting will crush the stone completely. The smaller the stone and the healthier the bladder, the longer each sitting may be made and the fewer are the operations which will be required. The first sitting should be shorter than the others. Crush the calculus by a series of short sharp turns of the screw. Usual interval between sittings three or four days. Throughout the process keep the posi-

¹ This is the old rule, now upset by Bigelow's experience and teachings (see Litholapaxy).

tion recumbent, more especially in the interval between the first and second sittings. It is at that time there is great danger of impaction of an angular fragment in neck of bladder or in urethra. When removing lithotrite always previously see that the male blade is pushed home, and that there is no fragment separating it from the female. The fragments and *débris* may be left to be washed out by the urine, or partly brought away through a silver catheter with a large eye in its concavity ; or they may be washed out by means of Clover's syringe.¹ Finally, before pronouncing the case complete, a most careful exploration of the bladder should be made with a small lithotrite, lest a single fragment should remain to form the nucleus of a new stone. The diet should be rather low, the drinks demulcent and copious, the clothing warm. Morphia suppositories may be useful.

Accidents and Complications of Lithotrity.—1, Impaction of fragments in urethra or in neck of bladder ; 2, retention of urine ; 3, cystitis ; 4, renal irritation, and even suppression of urine ; 5, orchitis ; 6, abscess in prostate ; 7, inflammation of veins around neck of bladder ; 8, pyæmia ; ninthly, may be added effects of culpable clumsiness in operating, *e.g.*, laceration of the urethra or bladder. Impaction of fragments in urethra demands instant treatment. If it occurs near bladder, endeavor to push back fragment with large catheter. If it is nearer the meatus, attempt to extract it with Civiale's urethral scoop, using the greatest care and gentleness. It may be necessary to open the urethra from without. Retention of urine is usually only temporary, and yields to warmth and liq. opii. Cystitis may only be an aggravation of a condition existing before the operation, or it may be due to sharp fragments, or to the atony of the bladder, which in old people may prevent the expulsion of the fragments. It must be treated on general principles, one of which will be to remove the cause. The application of this principle may demand the use of the lithotomy scoop or of Clover's or of Bigelow's syringe, or even the performance of median lithotomy to remove the irritating fragments. The appearance of unpleasant symptoms in the course of a lithotrity case is usually held to indicate a prolonged interval between the sittings. Renal irritation demands cupping to the loins, warmth, purges, etc.

Lungs.—See CHEST, INJURIES OF.

Lymphatics and Lymphatic Glands.—Both are liable to inflammation, to wounds, to hypertrophy, and to cancer. The former are also subject to varix.

Lymphangitis and Lymphadenitis.—Inflammation of the lymphatics and their glands. Like other inflammations it may be acute, subacute, or chronic. Most of the differences between these three forms are such as are analogous to their differences in inflammation of other superfi-

¹ See also Litholapaxy.

cial parts. *Causes*.—Almost always, especially in the case of acute and sub-acute forms, absorption of inflammatory or septic material from a wound or pustule, or fissure or sore. According to Paget, the poison or irritant, at all events in the instance of post-mortem virus, may be absorbed through unbroken skin. Chronic glandular inflammation and enlargements are scarcely distinguishable from strumous glands on the one hand, and from lymphoma on the other; they will, therefore, not be further noticed here.

Anatomy.—Chiefly deduced by analogy from observations on uterine lymphangitis. Vicinity of lymphatics and glands is the seat of hyperæmia and plastic infiltration. This often leads in parts to local (rarely diffuse) abscesses, including even deposits of pus in the lymphatics themselves. The process usually ceases at the first glands on the upward course of the lymphatics affected. The glands themselves become congested, swollen by serous effusion, and crowded to obstruction with corpuscles. The main terminations of lymphangitis are three: (1) resolution, (2) suppuration, almost always with satisfactory recovery, (3) pyæmia, and then usually death. Not unfrequently cases of dissecting wound with lymphangitis and abscesses in the track of the lymphatics affected, are wrongly spoken of as pyæmia. If such cases were true pyæmia, recovery in them would scarcely be so frequent as it is. The cellular thickening caused by lymphangitis and adenitis is often very persistent, and the small erysipelatous patches may enlarge vastly. *Signs*.—Track of inflamed lymphatics marked by red lines, or red band, or by mere thickening and hardening of the lymphatic cord. Often œdema in the neighborhood, or even of the whole region or limb. Pain, tenderness, stiffness. In certain places frequently patches of superficial cutaneous redness, similar to (possibly identical with) erysipelas. Where suppuration occurs, there is softening, easily detected by drawing the tip of the forefinger lightly over the part. The amount of fever and gastric disturbance varies from *nil* to the highest grade. Usually a sudden rise of temperature, even to $104-5^{\circ}$. In the course of any wound, rigors or such a temperature usually signify local lymphangitis. *Diagnosis*.—From phlebitis. Course of veins and of lymphatics not anatomically identical. No glands on the veins. Inflamed veins are “knotty.” *Prognosis*.—Usually in all respects good: but in the case of large operation wounds, compound fractures, and the like, signs of lymphangitis require very prompt attention; and there are certain forms of blood-poisoning which first manifest themselves by lymphatic inflammation, and which are singularly fatal. The fatality of such cases is usually due more immediately to pyæmia, phlebitis, thrombosis, and embolism; while its remote cause is often either the intense septic malignancy of the absorbed poison or perhaps local anatomical peculiarity, *e.g.*, proximity to cerebral sinuses. *Treatment*.—Rest, general and local; elevation, fomentations, poultices, pressure. Pressure, to succeed, should be very skilfully and gently applied. Equal parts of extractum belladonna and glycerine, on cotton-wool,

may be bandaged upon inflamed glands. Puncture as soon as softening is distinct. Mercurial ointment, iodine paint, pressure, and "massage" (shampooing) for persistent thickenings. Attend to general symptoms. Calomel and salines often valuable. As a rule, prefer low diet.

WOUNDS OF LYMPHATICS almost invariably close by spontaneous coagulation of lymph. Lymphatic discharging sinuses are very rare. *Treatment.*—Pressure.

VARIIX OF LYMPHATICS.—Very rare. *Treatment.*—Pressure.

Meningocele.—A congenital hernia of the membranes of the brain. When such a tumor contains brain, it is termed an *encephalocele*. *Causes.*—Probably a combination of imperfect development of the skull-wall with a tendency to hydrocephalus. *Signs.*—A tumor situated in the line of one of the sutures, usually in the median line and toward the occiput, sometimes at the root of the nose, or even in the pharynx. Occasionally there is a peduncle. Bluish, or color of natural skin, transparent, pulsating with the brain and with respiration. Sometimes compression of it will cause convulsions. More or less marked hydrocephalus almost always coincident. *Prognosis.*—Almost hopeless as to ultimate recovery. A small, pedunculated tumor without symptoms of hydrocephalus would give the most hope. *Diagnosis* from naevus or from congenital cysts may be difficult. "The diagnosis" of meningoceles and encephaloceles "rests first upon their congenital occurrence and position, at one of the membranous portions of the fetal head; next upon their fluid nature; thirdly, upon their considerable and decided increase in volume or tension, with strong expiratory efforts; fourthly, upon their reducibility in part or entirely; and fifthly, upon their sharing in the motions of the brain" (Holmes, in his "System of Surgery," vol. v., p. 968). *Treatment.*—Support carefully and gently with a smooth, soft pad and bandage. Puncture justifiable when increase is continuous. Injection of iodine has been tried with doubtful success. Annandale ligatured and excised successfully in a somewhat exceptional case.

Mollities, Ossium.—See BONE, DISEASES OF.

Muscles, Diseases of.—The chief are: 1, Atrophy and degeneration; 2, contractions; 3, inflammation; 4, paralysis; 5, parasites (trichiniasis); 6, syphilitic affections; 7, tumors. Some of the above are primarily nervous affections, but they are mentioned here for the sake of completeness.

MUSCLE, INFLAMMATION OF.—Chiefly occurs as an extension from inflammation of neighboring parts, or as a result of injury, or of syphilis. Liable to end in abscess, which may be very troublesome, especially in certain parts, *e.g.*, abdominal wall. Considerable pain and constitutional disturbance. *Treatment.*—Local rest, poultices, etc.

MUSCLES, ATROPHY AND DEGENERATIONS OF.—Four chief forms, viz., 1, simple atrophy; 2, granular degeneration; 3, fatty degeneration; 4,

“waxy” degeneration. *Simple atrophy* is the form which occurs from disuse, *e.g.*, in chronic joint disease. Microscopically there are abnormally few striated muscle-fibres, and the appearance becomes more that of fibrous tissue. Waxy degeneration occurs as a sequel of continued fevers. All the forms of degeneration are found in progressive muscular atrophy. The microscope shows in the case of fatty degeneration numbers of fat-cells in the place of the muscle-fibres, and in the case of waxy degeneration a “homogeneous, colorless, glistening mass.”

PROGRESSIVE MUSCULAR ATROPHY.—*Vide* medical works in which it is most fully treated, *e.g.*, those of Trousseau, Reynolds, Niemeyer, Charcot (“*Maladies du Système Nerveux*”), etc. For *treatment* of atrophy, see that of PARALYSIS OF MUSCLES.

MUSCLES, CONTRACTIONS OF.—*Causes*.—1, Inflammation of, or abscess in the muscle; 2, disease of nerves or nerve-centres; 3, reflex irritation, *e.g.*, from worms (intestinal irritation), phimosis (sexual irritation); 4, “antagonism,” *i.e.*, contraction of one set of muscles because its opponents are paralyzed; 5, continued relaxation of a muscle, *e.g.*, the state of the flexors of a limb which has long been kept on an angular splint. Muscles in such a state tend to become permanently shortened. Most cases of paralytic talipes are probably caused by the limb permanently assuming a certain position under the influence not, as was formerly supposed, of “true antagonistic” contractions, but of mere gravity; 6, mal-development; but a muscle which has never been developed to its proper length cannot be properly termed “contracted.” The diagnosis of the affection is manifest; that of its cause depends chiefly on the history. *Treatment*.—In a few cases it is sufficient to remove the cause, *e.g.*, to circumcise for phimosis, or to give santonin and scammony for worms. In mild cases, regular manipulation by stretching or continuous mechanical extension may suffice. But usually tenotomy is indicated. See CLUB-FOOT. Tenotomy should be followed by mechanical extension, either gradual or immediate and total.

MUSCLES, PARALYSES OF.—Almost all cases which the surgeon has to treat may be classified as: 1, those arising from injury to nerves (see NERVES, INJURIES OF); 2, those arising from direct blows on a muscle; 3, infantile paralysis; 4, Duchenne’s disease; 5, paralysis from disuse; 6, neuromimetic or hysterical paralysis. Paralyses from direct injury require rest till tenderness has disappeared; afterward, manipulation, rubbing, kneading, and passive exercise.

INFANTILE PARALYSIS.—*Causes*.—Can sometimes, but rarely, be traced to catching cold. Almost, but not quite, exclusively a disease of childhood, from infancy to the fourth year, inclusive. Four times as common in summer as in winter (Sinkler). Similar, though perhaps not identical, paralyses occasionally follow acute diseases, such as measles. *Symptoms*.—Sudden commencement, usually with fever; sometimes with severe cerebral

symptoms (deafness, delirium, coma, general convulsions). Very rapidly developed, complete paralysis of certain parts, with entire relaxation of the affected muscles. Parts affected, variable. Generally lower limbs. Sometimes one or both arms, or separate muscles, *e.g.*, deltoid. Serratus magnus sometimes affected (Lees, "Clinical Society Transactions," 1879). The muscles atrophy, the development of the bones is retarded, and, the local circulation stagnating, the limbs become cyanotic. But the general health and nutrition remain vigorous, and there is no affection of the sphincters, nor any considerable disturbance of sensation. In the course of time deformities result, *e.g.*, talipes, contracted hip, etc. *Pathology*.—Essentially an inflammation of the anterior horns of the gray matter of the spinal cord, especially in the lumbar and cervical enlargements. *Prognosis*.—Little or no danger to life or general health, except indirectly from the crippling. But little hope of important benefit from treatment, except orthopædic. *Treatment*.—In early stages, treat the main affection vigorously (of course, not forgetting patient's tender age). Strips of blister along spine, near cervical enlargement in case of paralysis of upper extremities, near lumbar when legs are affected. Cathartics. Ergotine, belladonna, or pot. iod. internally. Prone position, if possible. Cold affusion for severe head symptoms. Later on, galvanism. Constant current to spine itself. Large electrodes, one to cervical or lumbar enlargement, other to anterior surface of trunk. Alternate place of anode and cathode every two minutes. Persevere at intervals for years (Erb). Faradic electricity to affected muscles. Anode to spine or nerve-trunks; cathode to muscles. Fresh air, good diet, cod-liver oil, warm clothing to limbs. Massage, friction, "beating," sea-baths. Orthopædic treatment and appliances. To prevent the necessity for these, keep the paralyzed limb in a good position when at rest. Paralytic deformities are mainly caused by action of gravity, but partially perhaps by antagonistic contraction of the stronger muscles.

DUCHENNE'S DISEASE, OR PSEUDO-HYPERTROPHIC PARALYSIS.—*Cause* unknown. Age, childhood. *Three stages*: (1) of weakness of muscles of lower limbs; (2) of gradual hypertrophy of, successively, gastrocnemii, glutei, and lumbar muscles, weakness still persisting; (3) of wasting and increased paralysis. The muscular enlargement is due to growth of connective tissue and fat. Idiocy often coexistent. *Prognosis*.—Bad. Quite hopeless in third stage. *Treatment*.—Electricity; manipulation; "shampooing."

PARALYSIS FROM DISUSE is practically identical with atrophy, and requires shampooing, passive or active exercise, and perhaps stimulus of electricity.

HYSTERICAL PARALYSIS.—*Vide* HYSTERIA.

MUSCLES, TUMORS OF.—Almost any variety may occur. Sarcomata probably most common. Ossifications of muscles themselves present appearance of hard tumors. Such ossifications sometimes affect the adductors of cavalry soldiers ("rider's bones"). Cysts. Cancer. The *Trichina spiralis*,

a nematoid worm, is a parasite which lies encysted in the muscles of patients affected with "Trichiniasis," as the affection is termed.

MUSCLES AND TENDONS, RUPTURE OF.—Tendo Achillis and quadriceps extensor of thigh most often affected. Occurs chiefly in middle age. *Treatment.*—Fix in a relaxed position for a fortnight. Resume use cautiously and gradually.

Nævus.—*Vide* TUMORS, VASCULAR. (Angiomata.)

Nails.—*Chief Affections.*—Ingrowth, onychia, hypertrophy, and psoriasis.

NAIL, INGROWN TOE, is really the overgrowth of the flesh at the side of the nail, caused by pressure of boot and by not cutting the nail square. *Treatment.*—Bad cases require perfect rest. With the point of a penknife insinuate a little cotton-wool beneath the side of the nail and between the edge of the nail and the overlapping flesh. Avoid cutting the nail. Poultice and rest thoroughly if there is much inflammation. In a few cases avulsion of the whole nail (of course, under either local or general anæsthesia) may be necessary.

ONYCHIA.—An ulceration of the matrix of a nail. Varies much in severity. The worst cases are termed "*Onychia maligna*." *Causes.*—Bad constitution; weakly children especially liable; local injury, neglect, syphilis. *Signs.*—Ulceration sometimes confined to one angle of the matrix, sometimes extending along both sides and base of matrix. Nail blackens, loosens, and peels off, perhaps in strips. Sanious, foul discharge. Often great pain. *Treatment.*—Remove nail. Carry hand in a sling beneath chin; poultice a day or two; then dress with ung. hyd. oxid. rubri, or carbolic oil. Nitrate of lead. Ung. iodoformi would be worth trying when inflammation is reduced. \mathcal{R} . Liq. arsenicalis, 3 iij., aquæ ad. 3 ij. M. Ft. lotio. Black wash. Internally give tonics and cod-liver oil.

HYPERTROPHIED NAILS should be removed, and measures be taken to protect against local irritation.

PSORIASIS OF THE NAILS.—"The central part of the nail becomes thickened, rough, and scabrous, and unnaturally convex; the free edge is often split; the cuticular fringe at the bottom of the nail is ragged and retracted, leaving a deep fissure between the nail and the skin of the finger. The whole nail, in an extreme case, resembles the outside of the concave shell of an oyster" (T. Smith). *Treatment.*—Smooth down with sand-paper. Dress at the margin with equal parts of ung. picis liq. and ung. hydrarg. ammon. Constitutionally give arsenic or antisypilitics, as may be indicated. Remember that *parasitic* disease of the nails—"ring-worm"—occurs, but with extreme rarity. May be detected by the microscope.

Neck, Injuries of.—*See* SPRAIN; THROAT, CUT; SPINE, DISLOCATIONS OF, etc.

NECK, CONGENITAL FISTULÆ IN, called "Branchial Fistulæ," because they

are probably due to incomplete closure of the branchial clefts. Very small; usually give exit to a serous discharge.

NECK, TUMORS OF, are usually enlarged glands, or abscesses resulting therefrom. More rarely, adenomata, cysts, "hydroceles," aneurisms, or cancers. *See also* BRONCHOCELE. Lipomata not uncommon at back of neck.

NECK, HYDROCELE OF.—A cystic tumor, usually situated at the base of the posterior triangle. *Contents*.—Yellow or brown serous fluid. *Diagnosis*.—By fluctuation and transparency. *Treatment*.—Tap and inject with iodine.

WRY-NECK.—Depends on contraction of the sternomastoid. (Besides true wry-neck, there are hysterical wry-neck and a spurious wry-neck, caused by caries of the cervical vertebræ.) *Causes*.—*Vide* MUSCLES, CONTRACTION OF. *Symptoms*.—Distance from ear to sternoclavicular articulation, shortened on side of contracted sternomastoid. Head bent over toward, and face turned away from same side; head also bent downward. Contracted sternomastoid feels tense, especially when an attempt is made to raise head. Lateral curvature of spine frequently a secondary result. Arrested development of face on affected side. Other muscles besides sternomastoid sometimes contracted, but not so firmly. *Treatment*.—Divide sternomastoid subcutaneously, and afterward fix the head straight or slightly inclined toward opposite side by a special machine, or by strapping and bandages. A leather collar sometimes useful in mild cases. *Division of Sternomastoid*.—Divide close to origin. Divide sternal and clavicular heads separately. Turn edge of knife toward skin, first passing blade beneath muscle. Do not insert knife too deeply, as death has occurred several times from wounds of important vessels. *After-treatment* must be persevered in for a month or two. Manipulation suffices toward the latter part of the time. For hysterical wry-neck, division of sternomastoid is generally rather prejudicial than useful. Treat on the principles laid down for Hysteria, *q. v.* In wry-neck from spinal caries, treat the prime disease.

Nerves, Inflammation of.—(1) Acute, (2) chronic. Acute neuritis is uncommon, and is marked by *continuous* pain, tenderness, and swelling along the course of the affected nerve, and often by spasms of the muscles connected with it.

CHRONIC NEURITIS.—*Causes*.—Exposure to cold and damp; the same causes combined with injury, injury alone, excessive fatigue, rheumatic constitution. *Symptoms*.—Sometimes like those of acute neuritis, but milder and more persistent. *After death* the nerve is found swollen, injected, and occasionally suppurating. *Treatment*.—General and local antiphlogistics; rest; position of relaxation; leeching; purgation; iodide of potassium. Specific remedies when rheumatism, gout, or syphilis is diagnosed.

NERVES, TUMORS OF.—See TUMORS, NEUROMA.

Neuralgia.—Pain in the course of a nerve, and not caused by any visible disease or injury to the parts supplied by that nerve. *Causes.*—(1) Obscure injury to the nerve; (2) foreign body irritating it; (3) tumors pressing on it; (4) compression by contracted cicatrices; (5) overfilling of veins near nerves as they pass through long canals, *e.g.*, infra-orbital canal;¹ (6) poisons in the blood, *e.g.*, malaria, mercury, lead, copper, etc.; (7) neuralgia appears to be sometimes reflex, and to be caused by irritation of some other nerve than that affected. Lastly, in an immense number of cases, the cause is quite unknown. The exciting cause of a neuralgia is frequently catching cold, or exercising the part subject to the complaint. *Pathology.*—When any distinct anatomical change is found, the affection is no longer called a neuralgia, but a “neuritis,” or whatever may be the nature of the change observed. During a neuralgic paroxysm, there is generally local hyperæmia. *Symptoms and Course.*—Extremely various. Continuous or remittent or intermittent, short or enduring, circumscribed or diffuse, lancinating, aching, or burning. Often relieved, sometimes aggravated by pressure. Tender spots occasionally found, *e.g.*, where lateral intercostal cutaneous nerves pierce the external intercostal muscles in neuralgia of breast. Years sometimes do not suffice to remove obstinate neuralgia. *Treatment.*—Treat cause. Iron in anæmia. Quinine in remittent cases. Anti-rheumatics in rheumatic cases. *Locally:* linimentum aconiti; linimentum belladonnæ; empl. belladonnæ; tinct. capsici; chloroform; chloroform saturated with iodoform; blisters; ether-spray; hot fomentations; ice; ung. veratriæ. Electricity, faradization; constant current. Also excision of nerves and nerve-ganglia. *Internally.*—(Besides iron, quinine, etc., mentioned above) chloride of ammonium in half-drachm doses; phosphorus; croton-chloral (gr. v. every three hours); chloral; gelseminum; chloroform; “tonga,” in 3j. doses, three times a day; stomachics; tonics, etc. *Vide* works on “Therapeutics;” change of air and scene; hydropathy; colchicum in gouty subjects. Sometimes morphia subcutaneously seems to be the only resource. But such injections are contraindicated in cases of great debility, in advanced age, in cerebral hyperæmia, and in organic disease of the heart (Erb).

Nipple, Sore.—Solid nitrate of silver to any fissure. Ung. hyd. nit. No soap, merely hot water in washing. Lotions of zinci sulph. or borax. Leaden shields. Cure any aphtha of child’s mouth.

Nipples, Retracted.—When merely a natural conformation, attempt to bring out by repeatedly drawing with the breast-pump.

Noma.—See CANCRUM ORIS. Disease attacks external genitals of female children as well as mouth.

¹ Henle, quoted by Niemeyer.

Nose, Diseases of.—Those which require special notice are acne rosacea, lipoma, lupus, epithelioma, chronic nasal catarrh, ozena, syphilis, tumors (including polypi), and deformities.

ACNE ROSACEA.—Occurs chiefly in young women, in women of 50, and in men advanced in life. *Causes.*—Indigestion. Disorders of sexual system. Local irritation, *e.g.*, from exposure to sun and weather. When attacking old men the cause is usually spirit-drinking. *Pathology.*—Cutaneous hypertrophy and capillary congestion. Sebaceous glands not necessarily affected. *Treatment.*—Remove the cause if possible. Regulate the habits. Treat indigestion. *Locally.*—Ung. sulphuris iodidi. Lotio hydrarg. perchlor. (gr. ij. to $\bar{3}$ j.). Bathing with water as hot as it can be borne. Abstinence from stimulants. Riding and driving exercise. The dilated capillaries may be slit up and touched with liq. ferri perchlor.

NOSE, LIPOMA OF.—Integumentary and subcutaneous hypertrophy of alae and tip of nose. Variable in extent and size. Attacks old men. Fibro-cellular and *not fatty* in structure. *Treatment.*—Removable by suitable incisions. Slight danger of erysipelas.

NOSE, LUPUS OF.—*Vide LUPUS.*

NOSE, EPITHELIOMA OF.—*See CANCER.*

NASAL CATARRH, CHRONIC.—*Causes.*—Residence in damp, cold localities, repeated acute catarrhs, constitutional predisposition, struma, exposure to draughts, irritating dust, irritation of nasal polypi (and specific causes—see “Ozena”). *Signs.*—Mucous membrane swollen, red, covered with secretion, mucous or muco-purulent, moist or crusted. Sometimes a nasal tone of voice. Nose may be occluded by swelling of mucous membrane. Pharynx usually also affected. *Treatment.*—Treat the cause. Nasal douche with solutions of chlorate of potash, common salt, phosphate of soda, and carbonate of soda, in hot water (hot water is preferable to lukewarm). Use douche twice a day. Solutions should be just strong enough to taste saline. Later on, astringents should be added in small quantities to the saline washes. Nose not to be blown for a short time after douching. The same fluids may be applied with an atomizer instead of the douche. Inhalation of vapor of chloride of ammonium. Insufflation of powdered alum, bismuth, and starch, etc. Iodoform powder sniffed up. Iodoform in vaseline (gr. xx. to $\bar{3}$ j.): applied with a small brush far up each nostril (Lennox Browne and Brandeis). With regard to the douche, it should be noted that Professor Roosa of New York strongly condemns it as too dangerous to the ears; and even Professor Cassells, who stoutly defends it, never trusts patient to use it himself. Sleep with a high pillow. Moderate diet. Fish and milk. Avoid stimulants. Cod-liver oil at night sometimes beneficial. Change of air and scene. Dry, elevated regions. Internally, large doses of chlorate of potash.

OZENA.—An habitual and offensive odor from the nose, often amounting to a horrid stench, and almost always of a certain characteristic nature.

Causes.—(1) Strumous ulceration, (2) syphilitic ulceration, (3) necrosis from non-specific causes, (4) long-continued chronic catarrh, (5) foreign bodies impacted, (6) merely a peculiar tendency to decomposition of the nasal secretion. *Seat of Disease.*—Any part of nasal walls, or of sinuses opening into nose. *Amount of discharge* very variable. Often all passes backward into pharynx. *Prognosis.*—Unless cause can be detected and easily removed, ozæna is very difficult to cure. May last for years. When complicated with bone disease, deformity a frequent result. *Treatment.*—Antisyphilitics for syphilis. Cod-liver oil, iron, arsenic, etc., for struma. Explore nasal cavity carefully with a strong light, a mirror, and speculum. Remove dead bone. Nasal douche with hot alkaline or salino-astringent solutions (*see* NASAL CATARRH). Solutions of Condyl's fluid. Insufflation of mercurial powders—white or red precipitate, 2 grains to 1 drachm of sugar. Iodoform (*see* NASAL CATARRH). Pugin Thornton strongly recommends spray of solution of borate and carbonate of soda.¹ In syphilitic ozæna of infants, syringe out nostrils with hot saline solutions, and afterward insert melted ung. hyd. nitrat. dil., or iodoform ointment. Of course remove foreign bodies. Treatment of ozæna must be persevering, and used twice or even three times a day.

NOSE, TUMORS OF, are either (1) "mucous polypi," (2) "fibrous polypi," (3) malignant, (4) cartilaginous, or (5) osseous. The first three are the most common, especially the first. *Causes.*—As obscure as those of tumors elsewhere; but mucous polypi sometimes appear to arise from tumors elsewhere; but mucous polypi sometimes appear to arise from long-existing chronic catarrh. *Symptoms and Diagnosis.*—Those of nasal or nasopharyngeal obstruction, often combined with nasal catarrh and leading to deformity of the face. Mucous polypi may usually be seen and recognized by their pale, semi-transparent appearance and soft consistence. Fibrous polypi cause hemorrhages, are red and firm, are usually single, and are attached to the roof of the nasopharyngeal cavity. Malignant tumors grow rapidly, bleed, fungate, infiltrate neighboring parts, cause pain (often considerable), and cachexia. Cartilaginous and osseous tumors are rare, and may be known by their consistence. Very rarely certain extraordinary loose osseous tumors are found in the nose or the adjoining sinuses. *Pathology.*—Mucous polypi are fibrocellular tumors, or myxomata, or fibromyxomata. Fibrous polypi are fibrosarcomata or pure sarcomata. Mucous polypi are usually attached to the outer side of the nasal cavity, especially to the middle turbinated bone. Fibrous polypi spring from the periosteum. They are usually attached toward the back of the roof of the nose. *See* CANCER, for the structure of cancerous tumors. *Treatment.*—Twist and tear out mucous polypi with polypus forceps. Ordinary dressing forceps do not usually bite well enough.

¹ R. Sodæ carb., sodæ biborat, ʒʒ 3 ij.; liq. sodæ chlorinatæ, 3 ss. to 3 ij.; glycerini, ʒ j.; aq. ad. ʒ viii.

Afterward, to prevent or delay recurrence, prescribe tannin as snuff, or else spray of solution of sulphurous acid. A. sulphurosi (P.B.), j. to aquæ iij. Polypus snare. *Nasopharyngeal polypi*. Fibrous polypi, if they cannot be snared, may require operations even of the first magnitude, e.g., removal of superior maxillary bone. Other procedures involve cutting through hard and soft palate, or slitting up nose close to middle line, or Langenbeck's operation, which resembles excision of upper jaw, only that bone, after being turned out, is replaced. Cancer requires excising like fibrous polypus, unless too far advanced.

ABSCCESS is an occasional cause of swelling in the nose, especially during syphilitic disease. Open early.

NOSE, DEFORMITIES OF.—Congenital are very rare. Flattening from syphilis or from accident is difficult to treat, especially the former. To raise a nose depressed by fracture, instruments such as those of S. Gamgee may prove useful.

Œsophagus, Foreign Bodies in.—May lodge in any part, but usually stop at commencement just behind cricoid cartilage. *Symptoms.*—Local pain, especially on attempting to swallow. The character of the pain and the presence or absence of dyspnœa depend on the nature and size of the body. So also do the *prognosis* and *treatment*. A soft, soluble, or macerable substance may pass eventually with little or no external assistance, or may easily slip down before the probang. A pin may be caught by the horse-hair probang, and a coin by the "coin-probang," or either may be brought up by forceps, such as those of Bryant. But large jagged bodies may demand a cutting operation; and, when they cannot be recovered by less serious means, œsophagotomy had better not be delayed. Urgent dyspnœa may demand laryngotomy or tracheotomy. Oil the probangs and œsophageal bougies before using them. The fingers are useful, not only for examining the pharynx, but for hooking out foreign bodies from its lower end. If the foreign body reach the stomach, keep the patient in bed, and give large quantities of bulky food, but no drugs.

ŒSOPHAGOTOMY.—Scalpels, forceps (dissecting and artery), retractors, director, probe, œsophageal forceps, or some other long curved instrument to act as a staff passed down the œsophagus. Place a pillow beneath shoulders. Incision for five inches along anterior border of sternomastoid (left, unless foreign body project to right), with its centre opposite position of foreign body. Proceed as in tying carotid; but instead of opening carotid sheath, retract it and its contents outward. Retract larynx the other way. In opening œsophagus, take care not to wound recurrent laryngeal nerve. Feed for a few days through an œsophageal tube passed through mouth and beyond wound. *Prognosis* very good.

Œsophagus, Stricture of.—*Forms*: 1, cicatricial after injury; 2, idiopathic fibrous thickening; 3, syphilitic ulceration; 4, cancer; 5, pressure

of neighboring tumors. No. 2 is very uncommon; No. 4 is, unfortunately, not so. The most usual form of tumor to compress the œsophagus is a thoracic aneurism. *Signs.*—The essential one is dysphagia—difficulty of swallowing. This may come on so gradually as to be unperceived until the power of swallowing anything but the smallest morsels has been lost. More or less pain. Progressive emaciation. The most terrible symptom to the patient is the feeling of unappeased hunger. Ulceration is indicated often by fetor of the breath, or by the presence of blood on a bougie passed gently. To *diagnose* the nature of the stricture, whether cancerous or syphilitic or simple, consider the age, history, and collateral symptoms of the patient—*e. g.*, a tumor may be felt at the root of the neck, or cancerous glands may be found in the neck, or examination of the chest may discover indubitable symptoms of aneurism, and so on. The patient's feelings are deceptive as to the locality of the stricture, he usually referring it to beneath the manubrium sterni. *Prognosis.*—In many cases, death from starvation, sometimes from hemorrhage or the spread of cancer. Difficult to treat even a fibrous stricture successfully with bougies. Great gentleness, tact, patience, and perseverance may succeed. Whenever the cause can be removed, the prognosis is good, unless there be a severe ulceration, likely to be followed by cicatricial contraction. *Treatment.*—First examine with a well-oiled bougie. If one can be passed gently, try to gradually dilate, by passing from day to day increasing sizes, unless the cause be manifestly pressure from without, *e. g.*, aneurismal. If the cause be clear, of course treat it. In case of doubt, iodide of potassium and rest are generally worth a good trial. Excision of cancer of the œsophagus has hitherto been unsuccessful; and gastrotomy (*quod vide*) has had discouraging results (two successes to many failures), perhaps partly because it is mostly postponed till too late. Life can be prolonged by nutrient enemata when swallowing has become impossible.

Orbit.—An enlargement here may be aneurism (*quod vide*), or abscess, or enlargement of lachrymal gland, or exostosis, or hydatids, or cancerous or other tumor.

Ozæna.—*Vide* DISEASES OF NOSE.

Palate.—*CLEFT PALATE.*—A congenital deformity, due to non-union of palate plates of palate bones and superior maxillaries with their fellows, or of the superior maxillaries with the premaxillaries, or to non-union of the two halves of the soft palate. The amount of imperfection varies from merely bifid uvula to a complete chasm from pharynx to face. Often complicated with hare-lip. The parts affected are more or less stunted in growth: hence width of cleft varies. *Treatment.*—An infant with cleft palate cannot suck: hence it requires hand-feeding. But it should be hand-fed with its mother's milk only for the first two months. Upon all cases, except a few in which the cleft is too wide, a plastic operation must be done. If possible, operate before the child has begun to talk. When

the cleft is hopelessly wide, let a dentist fit the mouth with an "obturator" of gold or vulcanized rubber.

Staphylorrhaphy (for cleft of soft palate).—Essential steps of the operation are three, viz., (1) paring edges of cleft, (2) uniting them by sutures, (3) incising to relieve tension. Chloroform children. Anæsthesia optional in case of adults. Insert Smith's gag. (It is as well to see that this gag fits on the day before the operation.) The edges are pared by means of long forceps and long-handled knife. Avoid unnecessary and rough sponging, as it increases flow of saliva. Sutures are of horse-hair, catgut, silk and silver wire. Their strength is in the inverse order in which they are named here. The ends of silver wire may irritate the tongue. Alternate sutures of horse-hair and silk answer well. The sutures are passed by long-handled and curved needles. Startin's needle. Plan of passing thread through one flap, then through loop of a thread already passed through other flap, and lastly dragging it completely through by means of this loop. There is a simple little instrument for twisting wire sutures. Pass most of the sutures before tying one. Check bleeding before tying. Bleeding rarely troublesome. Iced water, gentle pressure with small sponge, and waiting a minute or two, suffice to check it. The accessory incisions to relieve tension may be done (1) a few days before the operation, as suggested by Callender, or (2) just before the operation, or (3) just after the operation. They are either (1) simply lateral cuts parallel to the cleft and close to alveoli, or (2) more scientifically planned proceedings to divide levator palati and palatopharyngei. Palatopharyngei divided by merely snipping across posterior pillars of fauces. Two ways of dividing levator palati, viz., Fergusson's and Pollock's. Few people competent to perform either with certainty after merely reading a verbal description; while any one can do either after half a minute's practical illustration. Fergusson divided the perpendicular part of the levator palati midway between the Eustachian tube (its origin) and the hamular process, where it bends into the palate. Pollock divides the horizontal part of the levator palati as it lies in the soft palate. Fergusson used a rectangular knife, which he passed through the cleft in the palate. Pollock uses a straight knife which he passes *through* the soft palate close to the hamular process (which can be felt with the finger). "If the palate will not come easily together, two lateral oblique cuts may be made, one on either side, above the highest suture, separating the soft from the margin of the hard palate to a small extent" (T. Smith).

HARD PALATE, OPERATION FOR CLEFT OF.—Resembles, in principle, that for cleft of soft palate. Mucous membrane and subjacent periosteum are scraped from lower surface of palate plates. Incisions are made along alveolar border of palate, and the edges of the cleft pared. Then the loose dependent flaps are brought together in the middle line, and united by strong sutures. Beware of "buttonholing" the flaps in scraping

them. Various forms of raspatories may be used. In separating the flap from the bones, work from without inward.

When to Remove Sutures.—Lower two on second day, the rest alternately, according to position, on third and fourth day. *Soft food* till union is complete. The less conversation the better. The last observations apply to both hard and soft palate. Cleft of both hard and soft palate may be dealt with at one operation.

PALATE, NON-MALIGNANT TUMORS OF, are usually either (1) cystomata, or (2) fibromata, or (3) papillomata. *Abscess* also occurs.

PALATE, ULCERATION OF, a frequent result of syphilis, but not always specific. *Treatment.*—Mercurial gargles and specific remedies.

PALATE, PERFORATION OF, the result of disease (syphilis, more rarely small-pox and measles) or injury, may require an obturator.

Paracentesis Abdominis.—*Position of Patient.*—On side near edge of bed. An ink-mark may be made exactly in median line, midway between umbilicus and pubes, as patient lies on his back before turning him on his side. *Preparation.*—Ascertain by percussion presence of fluid in spot to be pierced. Bladder should be empty. Apply a broad flannel belt round abdomen with its ends behind held by an assistant, who keeps up gentle pressure while the fluid flows, and finally secures it. The tapping may be done through a hole in it. Use a cannula with an india-rubber tube leading into a bucket. Have ready strapping and pad of lint to apply after operation. Incise skin at point where the trocar is to be thrust in. *Dangers.*—(1) Hemorrhage, from not keeping to the middle line; (2) wound of bladder, from not emptying it; (3) wound of bowel, from not tapping in a thoroughly dull spot, or from plunging trocar in too deeply; (4) fainting.

Paracentesis Pericardii.—An operation of extreme delicacy. Use the aspirator. *Place of Puncture.*—Fifth intercostal space, two inches from sternum. Mark spot with ink. Use No. 1 or 2 Dieulafoy's needle. Aspirator cock must be turned as soon as needle-point is beneath skin, so that fluid may rush through needle the moment pericardium is opened. Direct needle upward and inward, and hold it perfectly steady.

Paracentesis Thoracis.—Formerly done with common trocar and cannula; now usually with an aspirator. *Position of patient,* sitting up in bed. *Preparations.*—Ascertain by percussion, etc., presence of fluid. Place taps of aspirator in proper position. *Place of Puncture.*—Fifth intercostal space in mid-axillary line, or a lower space more posteriorly, e.g., seventh, near angle of scapula. Both may be tried if fluid do not come through the first. *Operation.*—Puncture skin with a lancet. Insinuate aspirator needle with a twisting motion over lower rib, close to it (because intercostal artery is near upper rib). Then plunge needle smartly through pleura; turn cock of aspirator and collect fluid. Whether it is or is not such a serious matter to admit air into the pleural cavity has been the

subject of many papers and speeches. For references, *see* Neale's "Medical Digest," p. 240. *Dangers*.—Wounding (1) intercostal vessels, (2) lung, (3) diaphragm, (4) admission of air and consequent collapse of lung, empyema, etc. (?), (5) rupture of pleura or capillaries by excessive suction with the aspirator, (6) sudden death (*see Medical Times*, vol. ii., 1875, p. 382, etc.). If it is desired to make a *free incision*, this is easily done by cutting along a grooved needle used as a director. Keep close to rib below the space. A *counter-opening* can be made either in the same way as the first, or by the help of a long bent probe or director, inserted to be cut down upon.

Parotid Tumors.—Divided, for practical purposes, into (1) innocent, (2) malignant. Former commence near lobe of ear as small, hard swellings, perhaps originally enlargements of a lymphatic gland. They are fibrocartilaginous. Increasing, they tend to grow outward as a square mass, and inward so as to displace part or whole of the parotid. But cancerous tumors are more diffuse, more fixed, more painful, increase faster, and tend to infect the lymphatics of the neck. *Treatment*.—A movable tumor corresponding to the first description above given should be excised; a malignant tumor is fixed, and can rarely be advantageously meddled with. In excising a parotid tumor, cut as much as possible in the direction of the fibres of the facial nerve, and keep the edge of the knife toward the tumor. Simple tumors can sometimes to a great extent be shelled out. Facial paralysis, which sometimes follows these operations, is usually incurable. Remember the size of the vessels embedded in the parotid. Remember also position of Steno's duct, a wound of which may cause salivary fistula.

Pelvis, Injuries of, are thus classified by Birkett: 1, Contusions involving the soft parts in contact with the outside of the pelvis; 2, fractures and dislocations of the bones forming the pelvis; 3, injuries of those organs in relation with the pelvis which are connected with the functions (A) of micturition, (B) of generation, male and female, (C) of defecation. *See* BLADDER, RECTUM, URETHRA, PERINÆUM, FRACTURES, etc.

Penis.—Most common affections are venereal. Others are congenital malformations, usually slight; phimosis and paraphimosis; herpes preputii, warts, elephantiasis, cancer, gangrene, priapism.

PENIS, CONGENITAL MALFORMATIONS OF.—(1) Hypospadias; (2) epispadias; (3) deficiency of corpus spongiosum; (4) the penis may be bound down to the perinæum, between the testes, so as to arch forward during erection (I have seen one such case, and I think Mr. Erichsen's case of "Adhesion of Penis to Scrotum" was probably exactly similar); (5) adhesion between glans and prepuce.

HYPOSPADIAS.—Urethra stops short on lower surface of penis. Slight degrees common, and of no consequence. If it extend far backward, *e.g.*, so that the urethra opens near the root of the penis, both urine and semen are emitted at right angles to the penis. But even in such cases paternity

is not absolutely impossible. Plastic surgery is sometimes successful in such cases (*vide* Wood, *Medical Times*, vol. i., 1875; Jordan, *Lancet*, vol. i., 1876).

EPISPADIAS.—Urine flows from a groove on upper surface of base of penis. Always combined with extroversion of bladder, *q. v.*

In such a case as 4 (above) divide the adhesion. Congenital adhesion between prepuce and glans may be torn asunder with any small blunt instrument. With malformations, the following condition may be classed when congenital.

PHIMOSIS.—Prepuce cannot be drawn back. Either *congenital*, or the result of swelling, usually inflammatory and specific, of the prepuce (*acquired*). *Consequences of Congenital Phimosis.*—Local irritation, balanitis, calculous concretions between prepuce and glans. Urinary obstruction and vesical irritation. Masturbation. Reflex convulsions, paralyses, and contractions (Sayre). Even hip-joint disease (Barwell). *Treatment of Congenital Phimosis.*—Circumcise. If circumcision be objected to, success will generally attend steady efforts, repeated day by day, to draw back the prepuce. *Acquired Phimosis* must be treated according to the indications of each case. Generally rest in bed, cleanliness and patience suffice in an acute case; but occasionally it is absolutely necessary to either circumcise, slit up, or forcibly dilate the prepuce. If the prepuce be itself inflamed, it is best to merely slit it up in the dorsal middle line.

PARAPHIMOSIS.—The prepuce behind the glans strangles it, and cannot be pulled forward by the patient. *Treatment.*—Invariable success, except in old cases, may be expected from Mr. Furneaux Jordan's plan of compressing the penis gently and patiently in the cavity formed by hollowing slightly the palms of the two hands and then opposing them. Soon the oedema yields, and then the paraphimosis is reduced by the fingers and thumbs. The preliminary compression, if gently and patiently done, makes bearable an otherwise intolerably painful procedure. 2. In case of need, the following operation may be done: draw the glans forward, "then, passing the point of a narrow-bladed scalpel into the sulcus on the dorsum of the penis, make a perpendicular incision about one-third of an inch in length through the integuments at the bottom of the groove directly across it" (Erichsen). Thus the constricting band is divided.

HERPES PREPUTII may be mistaken for chancre. Distinguishable by its extremely superficial character, by the number of vesicles at first, and afterward by there being nothing to see except excoriation and pus. Lasts a few days. Readily cured by washing once a day with hot water and dressing with zinc ointment. Patients subject to it should never use soap to the part, but wash daily with water only and dry thoroughly.

PENIS, WARTS ON.—For pathology, etc., *vide* **CONDYLOMATA** and **SYPHILIS**. *Treatment.*—Snip off with scissors. Dress with cupri sulph. pulv. and zinci oxid. Or keep constantly applied lint soaked in acid. nitric. dil.,

3 ij. ; aquæ, Oj. In obstinately recurrent cases the prepuce should be worn back and the glans kept exposed.

PENIS, CANCER OF. EPITHELIOMA.—(Scirrhus is extremely rare.) Usually commences after middle life, on the glans, as a firm warty growth, with a broad base. Its progress resembles that of cancer elsewhere, but it is usually slow, and it seldom infects other organs. *Treatment.*—Thorough excision. Amputation not necessary where a clean sweep can be effected without so radical a measure. When there is sufficient doubt about the *diagnosis*, give a fair trial to antisyphilitic remedies.

PENIS, GANGRENE OF.—Besides the ordinary simple and specific inflammations to which the organ is liable, Humphry instances the following as recorded causes of gangrene: typhus and paraplegia. Spontaneous gangrene has been observed (Partridge).

PRIAPISM is rather a symptom than a disease, and points to one of two classes of *causes*: (1) reflex irritation, *e.g.*, from gonorrhœa, prostatic disease, and injuries to penis; (2) paralyzes, *e.g.*, from injuries to spinal cord.

The penis is liable to many other affections common to the ordinary tissues, and these are frequently mistaken for specific affections; *e.g.*, I have known one of the most able specialists in London to diagnose an inflamed lymphatic as a hard chancre. *Phlebitis* occurs occasionally, producing the ordinary symptoms.

PENIS, INJURIES OF.—Chief points in connection with these are that (1) extensive contusion produces priapism, lasting for days; (2) wounds should be carefully adjusted, and united by sutures; (3) bleeding is easily arrested by cold and pressure; (4) swelling of the penis in children should suggest the possibility of a string tied round the organ having been hidden by the swelling.

Perinæum.—Chief affections are abscess and fistula. Hernia and a misplaced testicle in the perinæum occur very rarely.

PERINEUM, ABSCESS IN THE.—Commonly *caused* by a slight urinary extravasation behind a stricture. *Symptoms.*—At first attention is attracted by fever, perhaps rigors, and pain in the region of the bulb. A hard lump is felt; this increases and softens. *Treatment.*—Open early; incise in the middle line. If a stricture coexist, it is good practice to divide it at the same time (external urethrotomy). At all events the stricture, being the cause of the abscess, must be treated.

PERINEAL FISTULA.—A result of perineal abscess. Generally closes when the original stricture of the urethra is cured. Perineal fistulæ occasionally have their origin in comparatively remote affections, *e.g.*, cancer within the pelvis. In order to cure a perineal fistula it may be necessary to (1) teach the patient to catheterize himself four times a day, or (2) to incise the fistula freely, or (3) to cauterize it; (4) it is to be remembered that the presence of a small calculus may prevent healing (Thompson).

PERINEUM, INJURIES TO.—*Causes.*—Blows received in climbing over rail-

ings, etc., or by being thrown on the pommel of the saddle. Pressure of child's head in parturition. The injuries vary in seriousness from slight bruises to injuries involving such important structures as the urethra, rectum, and bladder. Parturition may result in—

Ruptured Perinæum.—Varies much in extent. The more extensive ruptures often allow the walls of the vagina, rectum, or bladder, as well as the uterus, to prolapse. The utmost annoyance may be caused by inability to hold the fæces. *Treatment.*—Sutures should be put in at the time when the injury occurs. Otherwise it is, except in trifling cases, advisable to postpone the operation until the child can be weaned and the mother restored to the best attainable health. *Operation.*—Scalpels with short and with long handles, forceps long and short, strongly curved needles with handles (*e.g.*, Baker Browne's needle), sutures of silk, whip-cord, and silver or catgut. Ligature, artery forceps, etc. Handled sponges. Duck-bill speculum; retractors. Lithotomy position. Assistant holds duck-bill speculum against anterior wall of vagina. Perinæum, etc., is shaved. Square flaps of skin and mucous membrane are marked out on either side of rupture, involving part of the vaginal surface of the recto-vaginal septum, and widening somewhat toward the surface of the perinæum. The flaps to be reflected thoroughly, not the slightest bit of mucous membrane to be left. But the flaps need not be removed altogether: should rather be left and sewn together over the vaginal edge of the wound. Pass posterior sutures first. It should go through recto-vaginal septum, *i.e.*, should never appear in the rupture at all. Suture to enter and leave skin at one inch from edge of wound. Fasten on two pieces of elastic catheter, or else use button suture. When deep sutures are tightened, wound gapes superficially. To remedy this add a few small silver sutures. Before sutures are tightened, stop all hemorrhage. Iced water usually recommended for this. I think hot water will be found to answer better (120° to 130° Fahr.). The hemorrhage will be less if the mucous membrane only, without any of the subjacent erectile tissue, be shaved off (T. Smith). To lessen tension, the superficial fibres of the sphincter ani may be divided laterally; or lateral incisions may be made a short distance outside the external ends of the sutures. Bowels should have been well opened before, and should, after the operation, be kept closed by liq. opii, ℥ x., *bis die*, for a fortnight. For ten days draw off urine thrice a day with a catheter; and for a week or two afterward patient should urinate on her hands and knees. Pay attention to the diet. Keep the wound and vagina clean. After washing with any antiseptic lotion, dry carefully and gently.

Periostitis.—*Vide* BONE.

Phagedæna.—*Vide* ULCERS and SYPHILIS.

Pharynx.—Its chief affections are inflammation, abscess, tumors, epithelioma, syphilitic disease, ulceration, wounds, and presence of foreign bodies.

CONGENITAL DISCONTINUITY OF PHARYNX AND ŒSOPHAGUS.—A complete monograph on this, by Ilott of Bromley, is in "Pathological Transactions for 1876."

ACUTE DIFFUSE PHARYNGITIS.—Highly dangerous. Usually spreads from fauces. Dyspnoea, dysphagia. Great swelling, internal (and often also external). *Progress* rapid. *Termination.*—Usually death, in a few days, either suddenly or with signs of sinking. *Pathology.*—Inflammation of cellular tissue of pharynx and of Œsophagus; great œdema; often suppuration. *Treatment.*—Supporting, stimulating. Enemata. Quinine. Laryngotomy to avert danger of suffocation.

POST-PHARYNGEAL ABSCESS.—*Cause.*—Often caries of cervical vertebræ. Most dangerous in children: because then may not be diagnosed till it has produced suffocation. May open externally in neck. *Treatment.*—Puncture with an abscess knife having its blade, except near the point, protected by lint. Finger may be used as a director.

ULCERS OF PHARYNX, usually syphilitic in adults and sometimes strumous in children. *Treatment.*—See Treatment of SYPHILIS and SCROFULA.

DILATATIONS AND POUCHES OF PHARYNX occur. Food is apt to lodge in them. Diagnose by the history given by the patient. Regurgitation sometimes occurs, or patient may be able to empty the pouch by external pressure. Secondary laryngitis may occur.

PHARYNX, FOREIGN BODIES IN.—*Vide* ŒSOPHAGUS.

Phimosi.—*Vide* PENIS.

Prostate.—*Chief Affections.*—Inflammation, acute and chronic; abscess, periprostatic abscess; hypertrophy; simple tumors; atrophy; tubercle; cysts; malignant disease.

PROSTATE, ACUTE INFLAMMATION OF.—*Causes.*—Gonorrhœa, cystitis, strong injections, cauterization, mechanical injuries, *e.g.*, from sounds. Catching cold, alcoholic excesses, and sexual excitement will determine an attack if some other influence pre-exist, such as gonorrhœa, gout, or rheumatism. *Symptoms.*—Local pain extending into loins and back, weight, and fulness. Frequent and painful micturition, especially painful at the close of the act. Pain becomes shooting and throbbing. Anal and perineal tenderness and fulness. Defecation painful. Micturition often difficult or impossible. Fever. Pus in urine when abscess bursts. *Per anum* the prostate can be felt enlarged. Piles may be induced. *Treatment.*—Rest in bed. An aperient to commence with. Antimony. Acetate of potash in full doses. Ten to twenty leeches to perinæum and round anus. Hot hip-bath. Poultices to perinæum. Retention usually relieved by hot baths and liq. opii. Or a soft catheter may be passed. Prostate remains for a long time afterward enlarged and hard, obstructing flow of urine.

PROSTATE, CHRONIC INFLAMMATION OF.—Usually a sequel of acute. Generally, but not always, enlargement of the gland. Obstruction to passage of urine. Anal and perineal pain. Gleet discharge. Sometimes nocturnal

emissions. Pain in sexual intercourse. Irritable bladder. *Treatment*.—Rest. Regular and unstimulating diet. Tonics and stomachics. Iron, with a mild aperient. Counter-irritation to perinæum. For the nocturnal emissions, make three or four applications of a solution of nitrate of silver (gr. x.—xxx. to ℥ j.) to the prostatic part of the urethra. As Sir H. Thompson says, “To be successful an efficient instrument is absolutely necessary, as well as care in injecting the fluid at the right spot.” For enlargement of prostate left by acute inflammation give a prolonged course of pot. iod. and pot. bromid. ; sea-bathing and tonics.

PROSTATIC ABSCESS.—1. *Acute*.—When prostatitis leads to abscess the acute symptoms persist for more than a week or two, pain and tenderness increase, rigors probably occur, and the prostatic swelling may throb. Fluctuation may be felt sooner or later, perhaps *per rectum*. Abscess tends to open into urethra, more rarely into rectum. Either termination is of good prognosis. In exceptional cases, abscesses recur again and again. *Treatment*.—Incise early in the median line of the perinæum. Foment and poultice. “When the suppuration is due to stricture, and probably extravasation, the propriety of dividing the stricture and laying open the perinæum down to the prostate cannot be questioned” (Bryant). 2. *Chronic Prostatic Abscess*.—Either a sequel of acute abscess or the direct result of old stricture of urethra. Whole prostate may be destroyed. Condition always serious. Chronic cystitis, progressive emaciation. *Treatment*.—Rest, highly tonic and soothing regimen, fresh air. Sometimes perineal incision is indicated.

PROSTATE, HYPERTROPHY OF.—A senile affection. Never occurs before fifty, usually over sixty. But, of old men, it attacks no greater proportion than one-half. Affects every constituent of the prostate, but chiefly the muscular and fibrous elements. Enlargement may be general or limited. In the latter case, an outgrowth sometimes occurs from the centre of the gland backward toward the bladder, improperly called the “enlarged third lobe.” Either lateral lobe may be disproportionately hypertrophied. Isolated, almost independent, tumors (myomata) are very common in the substance of hypertrophied prostates. They contain very little glandular substance, and that ill-developed. *Effect on the Urethra*.—Prostatic part of urethra is lengthened, and its antero-posterior diameter increased, while its transverse diameter is lessened. Its direction is altered in a manner which varies according to the part of the gland which is enlarged. The urethra takes an abnormal curve whose concavity corresponds to the lateral lobe most enlarged. So also the vesico-urethral orifice takes a crescentic form with the concavity toward the enlarged lobe. When the “third lobe” is enlarged, the urethra is bent suddenly upward in front of it. Occasional outgrowth of median portion of prostate, overlapping vesico-urethral orifice as a valve, which obstructs the flow of urine. *Size* of enlarged prostate often very considerably increased. Diameter of over four inches and

weight twelve ounces known. A weight of even one ounce signifies hypertrophy. Consistence varies. *Symptoms*.—(In earliest stage *nil*.) Diminution of force with which urine is ejected. Frequent desire to micturate; micturition is, as it were, incomplete. Uneasiness and weight about perinæum and neck of bladder. Tenesmus. Hemorrhoids tend to develop. Sometimes flattened stools. After a time, chronic cystitis. Sometimes urethral discharge, or frequent erections of penis. Urinary obstruction increases; bladder overflows at night. Bladder-dulness tends to ascend higher and higher in abdomen. General health gets worse. Accidental circumstances, *e.g.*, slight excesses, bring on attacks of retention. Small hemorrhages. Urinary changes similar to those of chronic cystitis. Neutral or alkaline reaction. Mucus. Phosphatic masses, soft and white. Muco-pus. *Diagnosis* is usually determined by examination with the left forefinger in the rectum. Information may be thus acquired concerning the size, shape, and consistence of the prostate, and concerning the presence, absence, or position of fluctuation. Such examination is assisted by simultaneously manipulating a catheter in the urethra. "If the catheter has passed easily, say for nine or ten inches, and still no urine flows; and if, in addition, while following its course, the handle has become more than usually depressed, there will be little doubt in respect of the existence of prostatic enlargement" (Thompson). Of course, with a healthy urethra, urine should flow through a catheter entered six and a half to eight inches. When the catheter is deflected laterally in passing, the side *toward* which the handle turns is probably the more enlarged. An examination should be made with a short-beaked sound, such as that pictured in Holmes's "System," vol. iv., p. 926; or one of those described and illustrated by Teevan in *Lancet*, vol. i. 1880. With this a possible calculus should be searched for. *Stricture of urethra* contrasts with prostatic obstruction in that (1) it occurs anteriorly to prostatic urethra, (2) it appears before middle life, (3) the stream of urine is more diminished in volume (in prostatic obstruction it is rather force than volume which is lessened). Other conditions from which prostatic enlargement has to be distinguished (though it may coexist with them) are *vesical calculus, tumor of the bladder, atony of the bladder, paralysis of the bladder*. Compare with the symptoms of these given under DISEASES OF THE BLADDER. *Treatment*.—A catheter should be passed twice a day, oftener where urination is extremely feeble. Patient should learn to catheterize himself. Elastic instruments preferable. Silver prostatic catheters are either made with a large curve or else with a short beak. Great irritability of the bladder, disturbing sleep, may require a vulcanized india-rubber catheter to be tied in all night. Treat coincidentally such complications as catarrh of the bladder (*quod vide*). Attend to the general health and regulate the habits. Clothe lower limbs warmly. Operations on diseased prostate are by most surgeons avoided.

PROSTATE, ATROPHY OF.—Unusual and unimportant.

PROSTATE, MALIGNANT DISEASE OF.—*Encephaloid* is the form which affects this gland. Occurs only in childhood and at advancing age. Progress very rapid in children. The symptoms are the usual ones of cancer, added to those of prostatic obstruction, including, especially, severe pain, occasional hemorrhages, and cachexia. Lymphatic glands of lumbar, and sometimes of iliac region, enlarge. Urinary deposit may exhibit cancer cells when examined. *Treatment.*—If catheterism cannot be avoided, be as gentle as possible. Relieve pain by anodynes, etc. Treat hemorrhage on general principles. Support the general strength. Perhaps Chian turpentine, which Clay appears to have found useful in carcinoma uteri, might be fairly tried here.

PROSTATE, TUBERCLE OF.—Very rare. Always secondary. Symptoms probably raise a suspicion of calculus; but no stone being found, and coincidence of symptoms of tubercle elsewhere, correct the diagnosis. Avoid instrumental interference; protect from other sources of irritation; and treat the tubercle and its results, *e.g.*, abscess, on general principles.

PROSTATE, CYSTS OF.—Small cysts sometimes occur. Often numerous; often contain small concretions. Probably dilatations of gland-tubules. No known symptoms of consequence; therefore no *treatment*.¹

Psoas Abscess.—See SPINE, CARIES OF; also ABSCESS, CHRONIC.

Psoriasis.—A “squamous” disease of the skin, always chronic, often recurrent—especially in spring and autumn—often syphilitic, sometimes hereditary. The sufferers are, for the most part, in perfect health, except when syphilitic. Infants and very old people are almost exempt. Psoriasis is a superficial dermatitis, without subepidermic effusion, *i.e.*, without causing vesicles. It forms red spots or patches, covered with white, shining (epidermal) scales. The classification of psoriasis into many varieties is of little more than nominal importance, *e.g.*, psoriasis guttata, psoriasis diffusa, psoriasis circinnata (formerly “lepra vulgaris”), psoriasis nummularis, etc., psoriasis palpebrarum, psoriasis scrotalis, psoriasis palmaris, psoriasis plantaris, etc. *Diagnosis of Syphilitic from Common Psoriasis.*—Syphilitic is (1) generally darker in color; (2) rarely affects knees and elbows; (3) is frequently palmar and plantar—the latter is always syphilitic; (4) may lead to painful fissures, and even ulcers. Non-specific psoriasis has for its favorite seats the extensor sides of the knee and elbow, because there the skin is coarse and dry. Of course, the history may be inquired into. *Treatment.*—Vigorous external treatment, and arsenic internally. Begin with two Turkish baths or several warm baths, using plenty of soap. Locally, prefer ung. picis. Olive oil, in conjunction with repeated baths, may suffice. Crocker recommends thymol ointment (gr. x.—xxx. to ̄j.). Ung. acidi chrysophanicı (gr. xx. to ̄j.)

¹ The above account of diseases of the prostate is chiefly condensed from the writings of Sir Henry Thompson.

(liable to stain linen). Begin with three minims of liq. arsenicalis three times a day, and gradually increase to six minims. NOTE.—Arsenic at first appears to aggravate the disease. Give it *after* meals. Other internal remedies are tinct. cantharidis and iodide of potassium (gr. x. doses).

For syphilitic psoriasis, rely mainly on ordinary antisyphilitics.

Pyæmia.—A disease characterized by remittent fever and the formation of multiple collections of pus in various parts of the body. It is a near ally of septicæmia and of ordinary surgical fever; but the scattered abscesses are characteristic. *Causes.*—The immediate cause is granted to be the absorption of pus or of septic material into the blood. It is still disputed whether pus, in order to produce pyæmia, must be putrefying; and it is still uncertain whether the immediate cause of pyæmia can be absorbed through the mucous membranes, or whether it can enter only through an open wound. Advocates of the germ theory suppose that almost every case of pyæmia is due to the entrance of microscopic germs into open wounds, and produce strong experimental proof of that belief; but how those germs cause the multiple abscesses is not so clear. The immediate cause of each scattered abscess ("metastatic" abscesses, they are often called) is venous thrombosis and embolism; but what is the exact way in which the thrombosis is brought about?¹ Some of the abscesses near the original wound are merely terminations of lymphatic inflammations, a track of inflamed lymphatics being sometimes traceable to them from the wound. Cases of pyæmia sometimes occur, apparently spontaneous in origin, and are called "idiopathic pyæmia." It must be remembered that their idiopathic nature rests on negative evidence only.

Conditions predisposing to pyæmia are (1) bad ventilation and foul air; (2) accumulation of many wounds in one ward; (3) neglect of having sick-rooms thoroughly and periodically cleansed; (4) dirty and careless dressing and nursing; (5) unnecessarily meddling with and disturbing injuries; (6) bad drainage; (7) other analogous conditions. A second set of causes belong more personally to the patient. They include (1) drunken habits, (2) old age, (3) weak constitution, (4) unmanageableness and restlessness. Many slight cases of feverishness have been converted into acute blood-poisoning by severe exercise, *e.g.*, ascending a mountain. "You will find in every day's practice that fatigue has a larger share in the promotion or permission of disease than any other single causal condition you can name" (Paget). "After wounds, children are singularly free from pyæmia" (Paget). *Pathology.*—The nature of the changes in the blood is unknown. Localities attacked are (1) joints, (2) viscera, (3) serous membranes, (4) mucous membranes, (5) skin; and to these may be added the veins, lymphatics, and cellular tissue throughout the rest of the body. In the viscera are found low inflammations and metastatic abscesses. The affected joints

¹ See note on Microscopic Organizations in Appendix.

and serous cavities are inflamed and filled with pus. External to the joints are œdema and flushes of redness. The affected mucous membranes are inflamed, and may give vent to great discharge. This, in the case of the gastro-intestinal canal, causes diarrhœa and even vomiting. When the skin is affected, blood-poisoning usually shows itself as erysipelas (*quod vide*), or as pustular inflammation. Veins become the seat of thrombosis, with or without precedent inflammation. Jaundice and suppression of urine sometimes occur in the course of pyæmia. *Symptoms and Course.*—

1. Of *acute pyæmia*. Rigors and feeling of illness. Perhaps purging and vomiting, with or without jaundiced hue of skin. High temperature. Rapid and frequent pulse. Erysipelatous inflammation of neighborhood of wound. Tender and inflamed glands. Acute pneumonia or pleurisy. Finally, “the patient—flushed, anxious, restless, even delirious—is in a hopeless condition, with prostration and rapid sinking.”¹ Duration: about five or six days. 2. *Subacute or chronic pyæmia*. A typical case presents, successively, the following symptoms: Wound dry and inflamed, its edges swollen. This local inflammation spreads. Pain and tenderness; burrowing of pus; fever; rigors; abscess forms near the wound; neighboring joint swells; other abscesses form. Large lymphatics and glands may inflame and suppurate. Fever continues; temperature rises and falls irregularly, high rises usually coincident with rigors. Distant joints swell. Progressive emaciation; yellow skin; no sleep; no appetite; despondency. Cough; pain in chest (indicating pleurisy or metastatic pneumonia). Tongue furred and dry. Bed-sores. Occasional delirium. Eyes dull. Finally, utter prostration and death. Duration of subacute pyæmia, two to four weeks; of chronic, one to five months. *Prognosis.*—Of acute cases, practically hopeless. Chronic and mild cases may recover, especially if prime cause can be removed. Paget relates a case which lasted three years and finally recovered. *Treatment.*—Chiefly prophylactic. It includes the whole art of treating wounds properly (*quod vide*). Cleanliness, quietness, etc. Antiseptic treatment. Hospitals properly situated, arranged, and ventilated; wards periodically cleansed and disinfected; clean bedding; obedient and sensible nurses. When pyæmia is actually developed, plenty of fresh air, diligent nursing, feeding with milk, eggs, etc.; cooling drinks; quinine (5–15 grains for a dose); morphia at night; hyposulphite of soda (gr. xx. every two hours); warm baths and wrapping in blankets to produce copious diaphoresis. In chronic pyæmia amputation may be indicated. Liq. potassæ (3 j. *ter die*) to remove pyæmic deposits (Paget). The commonest surgical causes of pyæmia are compound fractures.

Ranula.—A cystic tumor occurring in two situations, (1) close by frænum linguæ, (2) between mylohyoid muscle and mucous membrane. The latter form of ranula bulges externally between chin and hyoid bone.

¹ Callender in Holmes's System.

Contents : glairy, mucous fluid. But the second form may contain matter of a cheesy consistency. *Causes*.—Ranulas are probably “retention cysts,” but not caused by obstruction of Warton’s duct (Morrant Baker). *Treatment*.—Open in the mouth, and cut away a part of the cyst-wall. Empty, and if the fluid re-collects, repeat the operation, in addition cauterizing the interior of the cyst.

Rectum, Diseases of (for those of Anus, *vide* ANUS).—Stricture, cancer, polypus, malformation, hemorrhoids (*vide* HEMORRHOIDS).

RECTUM, STRICTURE OF.—Two kinds, viz., *Simple* and *Cancerous*. For latter, *vide* CANCER OF RECTUM. **SIMPLE STRICTURE.**—*Causes*.—(1) Contraction of simple inflammatory deposit in the walls of the rectum ; (2) syphilis ; (3) cicatricial contraction after operative procedures ; (4) or after sloughing caused by pressure during parturition ; (5) or after strumous, dysenteric, or other ulceration. The chronic inflammation which leads to stricture may be caused by the impaction of foreign bodies or by the constant irritation of hard feces. *Pathology*.—The seat of a simple stricture is marked by a fibrous deposit, which may extend wholly or partially around the bowel. When slight, it lies usually in the submucous tissue ; but often the whole thickness of the rectum is affected. The usual seat is from one inch to one inch and a half above the anus. Bowel above stricture dilated and hypertrophied. Secondary abscesses and fistulae often form, as in case of stricture of urethra. *Signs*.—(1) Constipation, (2) burning pain on passing a stool, (3) straining at stool, (4) blood or mucus in stools, (5) patulous anus, (6) “tape-like” motions, (7) detection of a stricture by digital examination or by a bougie. The 2d, 3d, 4th, and 5th signs mark the ulcerative stage ; the 6th sign is not thoroughly reliable. Examine very gently, especially if using a bougie. Roughness may do fatal damage. Do not mistake for stricture obstruction caused by mucous folds or by the pressure of pelvic tumors. Sooner or later the constipation ends in complete obstruction, which may come on with great suddenness. In advanced cases the general health breaks down under the influences of pain, dyspepsia, and anxiety. *Treatment*.—The prime agents are (1) dilatation by bougies, (2) incision. The latter is suited only for traumatic strictures close to the anus. Accessory means are, rest in bed, warm water enemata, regulated diet, morphia suppositories and hip-baths. Oil the bougies well, pass them every other day, gradually increasing the size. Patients, when cured, should continue to pass bougies or wax candles for themselves, either weekly or bi-weekly, or even daily, as may be found necessary. When complete obstruction occurs try rest, warm hip-baths, warm oily enemata and purgatives. The surgeon should not be in a hurry to operate, for these cases may relieve themselves after weeks of obstruction. The last resource is colotomy. When the stricture is high up, give the enemata through the long tube.

RECTUM, CANCER OF.—Usually *scirrhus*. *Pathology*.—Originates in pro-

liferation of the glands of the mucous membrane. These "grow in the shape of tortuous and branched tubes ; the calibre of the gland is often maintained ; and they fill with mucus, and the cylinder cells may maintain this form and become very large" (Billroth). The infiltration and induration tend to surround the rectum with a hard ring. "Leaf-like proliferations commence close above the sphincter ani." Ulceration. "Inguinal and retroperitoneal glands affected rarely and late." Ulceration may lay open bladder, urethra, vagina, peritoneum, hip-joint, etc. *Symptoms*.—At first, discharge of bloody mucus, and either constipation or diarrhœa. Defecation becomes more and more painful. Hemorrhage becomes more serious. Digital examination usually reveals the hard, nodular ring, and perhaps ulceration. *Diagnosis*.—At first from hemorrhoids, a little later from simple stricture. Usually settled by digital examination. *Treatment*.—1, Palliative ; 2, radical. 1. *Palliative*. Anodynes, *e.g.*, morphia suppositories ; afterward, morphia subcutaneously or by the mouth. Sometimes gentle aperients, warm water enemata. Enemata of cupri sulph. and opium or of zinci chlor. (gr. j.-ij. to $\bar{5}$ j. aquæ) may check foul discharges. Obstruction or extreme pain in defecation may demand colotomy. 2. *Radical*. Excision of rectum for cancer has usually been condemned on account of the risk of dangerous hemorrhage, and of opening the peritoneal cavity. But there are good reasons for taking an opposite view, *e.g.*, the neighboring glands are not secondarily affected at an early stage. Subject fully discussed by W. H. Cripps ("Cancer of the Rectum").

RECTUM, POLYPUS OF.—Usually occurs in children, is adenomatous in structure, apt to signify its presence by occasional hemorrhages, and may be snipped off with scissors. In exceptional cases a ligature may be considered necessary.

RECTUM, MALFORMATIONS OF.—*Vide* ANUS, IMPERFORATE.

RECTUM, INJURIES OF.—*Causes*.—May be classed as follows : (1) falls on sharp-pointed objects, *e.g.*, spikes ; (2) sharp bodies swallowed, *e.g.*, fish-bones ; (3) objects wilfully inserted ; (4) obstetric processes ; (5) surgical operations on neighboring parts. The first class usually recover thoroughly, unless fatal through complication with injury to more serious parts, such as the peritoneum. The causes of the 2d and 3d class require immediate removal with the aid of fingers, forceps, speculum, plenty of oil, etc. The 3d and 4th class of cases are apt to produce troublesome fistulæ. They should be treated with as little delay as possible. *Vide* VAGINAL FISTULÆ.

Rheumatism.—A name applied almost indiscriminately by the public to painful non-traumatic affections of the joints and muscles, more especially when chronic. The form called "rheumatic gout" chiefly concerns the surgeon. He terms it *chronic rheumatic* (or *rheumatoid*) *arthritis*. *Causes*.—Predisposing influences are mal-nutrition, poverty, approach of old age, male sex. Exciting cause usually unknown. Sometimes injury,

or disordered menstruation. *Symptoms*.—Pain in the affected joint, aggravated by wet or cold weather and by exercise. Stiffness. Wasting of muscles which act on the joint, *e.g.*, of glutei and hamstrings in chronic rheumatic arthritis of hip. Dry crepitation when the joint is moved. Eventually, more or less enlargement of the bones of the articulation. Thickening of the ligaments. Stiffness may proceed to ankylosis. When the *hip* is affected shortening takes place sooner or later from absorption of head of thigh-bone. Pelvis becomes oblique; foot is either everted or inverted. When the *temporomaxillary joint* suffers, dislocation of one or both sides of jaw forward may result from destruction of eminentia articularis. *Prognosis*.—Progress of disease usually not uniform, but effected by recurrent attacks with intervals of comparative comfort. But, unfortunately, the joints do not return to the normal state in these intervals. Recovery almost impossible. No direct danger to life. Billroth says: "When you have such a patient to treat, arm yourself with patience, and be not surprised if he consults first one and then another physician, and finally all the quacks about, and lastly, blames you for the origin and extent of his disease." *Diagnosis*.—From (1) serofulous arthritis, (2) gout, (3) dislocation from injury. Compare with symptoms as given elsewhere. Particularly consider history and course of disease, as well as age and circumstances of patient.¹ *Pathology*.—Begins by a fibrillous degeneration of the cartilages. "In some places it becomes nodular, then rough on the surface, may be pulled into filaments, and when the disease is far advanced it is altogether absent in places, leaving the bone exposed, quite smooth, and polished" (Billroth). Cartilage-cavities enlarged and containing increased numbers of new cartilage-cells. The bone, devoid of cartilage, compact, and polished by friction, is termed "eburnated." "Stalactitic" formation of osteophytes in immediate neighborhood of above changes. Bone being absorbed in one place and formed in another, situation of a joint may shift considerably. Synovial membrane thickened, slightly vascular, tufts elongated. Separate ossifications near the joint (additamentary bones). New bone always compact. Muscles of affected joint tend to contract. Joints tend toward a state popularly described as "drawn up;" witness rheumatic fingers of old people. *Treatment*.—Meant rather to arrest or to palliate than to cure the disease. Improve the diet. Remove from wet and cold localities. Clothe in flannel. Frictions with stimulating liniments. "Shampooing." Douching with alternately very hot and cold water. India-rubber bandages. Combinations of warm stomachics, diaphoretics and mild purgatives, *e.g.*, rhubarb, ginger, sulphur, mezereon, sassafras, cream of tartar, etc. Iodide of potassium, especially when pain is worse at night. Chloral and pot. bromid. when pain is very severe. *Actæa racemosa* (15 to 30 minims of tincture three times a

¹ See, in Appendix, Charcot's Joint Disease.

day). Residence at certain watering-places, *e.g.*, Buxton, Harrogate, and Aix-la-Chapelle. Leather or even plaster-of-Paris supports useful in some cases of rheumatic knee-joint. Treat menorrhagia, if present.

Rhinoscöpy.—Examination of nares by aid of the laryngeal mirror turned upward in pharynx. Difficult. *Natural Causes of Difficulty.*—1, Irritability of fauces, and of posterior wall of pharynx; 2, enlarged tonsils and uvula; 3, insufficient distance between uvula and posterior wall of pharynx. *Rules.*—Same as those for *Laryngoscöpy* (*quod vide*), up to Rule 6. Rule 7. Allow patient's tongue to remain at rest and untouched in the mouth. 8. Hold mirror like a pen and with the reflecting surface upward. 9. Let its shank rest lightly on the dorsum of the tongue; but be very careful not to touch the base of the tongue. Shift the mirror slightly to right or left of uvula, according to which side it is desired to examine. 10. Direct patient to exhale quietly and continuously by the nostrils.

Rickets.—Rachitis. A disease of early childhood, manifested chiefly by abnormal softness of the bones and consequent deformity, and by backward development of the teeth. *Causes.*—Improper feeding in infancy, especially giving young infants farinaceous food to supplement a scanty supply of milk. Other bad hygienic conditions probably assist. *Signs.*—At first the little patient often has diarrhoea. He shrinks from being touched; for movement is painful. Head perspires. Kicking off bed-clothes at night. Backward dentition. Laryngismus stridulus. Emaciation. The above symptoms are entirely or partially absent in older children. Disease usually commences in second year. The infant ceases to walk when disease is at its height. Deformity of chest (pigeon-breast) now takes place. Bow-legs, knock-knees, curvature of spine (lateral and antero-posterior), as well as, though more rarely, pelvic deformities, occur when the patient walks about again. "Beading" of junctions of ribs with costal cartilages. Enlargement of wrists, knees, and ankles. Fontanelles remain open. Head grows too fast, face too slow; hence projecting brows. Large bellies;¹ frequently enlargements of liver and spleen. Bronchitis. The subjects of rickets in childhood will not, in later life, attain normal height. *Pathology.*—Mineral constituents of bone not deposited in normal amount; but animal portions grow normally. Hence the bones soften, lacunæ enlarge, periosteum and epiphyseal cartilages proliferate; and, as ossification does not keep pace with this, long bones are apt to bend beneath the weight of the body, especially at the junction of their epiphyses with their shafts. For similar reasons the growing brain forces apart the cranial bones and keeps open the fontanelles. These changes near the epiphyses account for the beaded ribs, the enlarged wrists, and the deformed knees and shins. Also general thickening, with partial thinning of cranial bones. When the rachitis disappears, leaving a bent long bone,

¹ An early sign of great value (Clement Lucas).

the concavity of the curved bone is eventually strengthened by deposit of a ridge of compact bone. Rachitic pelves are usually flattened antero-posteriorly. Femora curve forward. Tibiæ and fibulæ usually bend forward and outward (chiefly at junction of lower epiphyses). Spine affected with general posterior curvature in early infancy, with lumbar lordosis in early childhood, and occasionally with lateral curvature. Thorax—"pigeon-breasted." *Diagnosis*.—Quite easy, except in early stage. *Prognosis*.—Sometimes fatal to very weakly infants. Recovery usual, but rarely without residual deformity. *Treatment*.—Correct diet. Plenty of milk. Sufficient animal food. Cod-liver oil. Syrup of phosphates of iron and lime. Parrish's chemical food. Vinum ferri. Cold sponging and dry rubbing. Fresh air. Splints and other mechanical contrivances to correct deformities. In severe cases, osteotomy, or forcible straightening of limbs under chloroform. Keep a young rickety child off its feet as much as possible without depriving it of fresh air and exercise. Sleep on a mattress.

Sacro-iliac Disease.—*Causes*.—Either struma or injury, or both together. *Symptoms*.—Local pain and tenderness. Pain during defecation, sometimes also during micturition. Peculiar posture (*vide* figures in Sayre's "Orthopædic Surgery," p. 333). Patient bends his body over from the affected side, "for the purpose of removing pressure from the diseased structures by bringing the weight of the limb to bear upon the ilium." Hence obliquity of the pelvis and apparent lengthening of limb on side of disease. When abscess forms, it may appear either over the articulation, or in the buttock, loin, groin, or even rectum. *Diagnosis*.—From neuralgia, sciatica, and Pott's disease, but, above all, from hip disease. In sacro-iliac disease, if the pelvis be firmly fixed, the hip-joint can be moved normally and painlessly. In sufficiently advanced cases, the pelvis can be seen to be deformed; and when abscess has opened, a probe will often reach dead bone. Sayre's vertebrated probe may be useful. When pelvis is not fixed, either lateral compression of trochanters or abduction of thigh causes pain. *Prognosis* bad. *Treatment*.—Rest, extension and counter-extension. Sayre puts a thick-soled shoe on the foot of sound side so that the affected limb swings free of the ground when the patient moves out of doors on crutches. Before suppuration takes place, use counter-irritation, especially the actual cautery. Dead bone, if detected by probe, should be removed if possible. Cod-liver oil, iron. High, dry, and healthy localities.

Salivary Calculus.—A concretion sometimes obstructs a salivary duct. Slit up the duct, if necessary, and remove it. May cause swelling of gland. Ducts usually affected are the sublingual or submaxillary.

SALIVARY FISTULA (1) from obstructed duct. *Treatment*.—Establish an opening into the mouth by passing a seton right through the fistula into the mouth and tying its two ends together. Part of the cheek is thus, of course, enclosed in the loop. When an opening into the mouth is thus

kept open for ten days, endeavor to close the external opening by cauterization, unless it close spontaneously. (2) Salivary fistula from abscess in a gland is difficult to cure. Try cauterization.

Sarcocoele.—See TESTICLE.

Sarcoma.—See TUMORS.

Scalp, Injuries of.—Vide HEAD.

Sciatica.—Neuralgia of great or of lesser sciatic nerve. *Causes.*—(1) Catching cold; (2) pressure of hardened feces in rectum or of pelvic tumors; (3) peripheral irritations, *e.g.*, inflamed corns; (4) many cases are of quite obscure origin. Always bear in mind that sciatic neuralgia may be only a sign of some more serious disorder. *Diagnose* from hip and from sacro-iliac disease. *Treatment.*—Vide NEURALGIA. In obstinate cases try cauterization (Corrigan's button), or even "nerve-stretching." Purgatives, quinine. Iodide of potassium. Morphia injections. Blisters. Electricity. For *Pathology*, etc., of Sciatica vide NEURALGIA.

Scrofula.—*Definition.*—A diathesis rather than a disease. Its characteristics are neatly given by Billroth as follows: "Exists chiefly during childhood, though more advanced ages are not free from it."¹ "Persons with this diathesis, especially children, are greatly disposed to chronic inflammatory swellings of the lymphatic glands, even after inconsiderable irritations, to certain inflammations of the skin (eczema, impetigo), especially of the face and head, to catarrhal inflammations of the mucous membranes, especially of the conjunctiva, more rarely of the intestinal canal and respiratory organs, to chronic inflammations of the periosteum, and of the synovial membranes of the joints." Formerly the condition called "tuberculosis" was unanimously included in the term scrofula. Majority of modern pathologists differentiate the two, while acknowledging the frequent origin of the former from the products of chronic inflammations induced by the latter. *Causes.*—Inheritance. Unfavorable conditions of life (?), *e.g.*, low, damp dwelling, want of light, insufficient food, mental depression. Attacks of acute infectious fever, especially measles. *Pathology and Symptoms.*—See under head of GLANDS, CHRONIC DISEASE OF; ULCERS, SCROFULOUS; JOINTS, CHRONIC DISEASE OF; OPHTHALMIA, STRUMOUS, etc. Chronic inflammations, the result of scrofula, are indolent and slow to disperse. They tend greatly to suppuration and caseous degeneration. Certain general appearances of the person are described as scrofulous types, especially two, viz.: (1) thick lips, muddy skin, coarse features, pot belly, flabby muscles, often with tendency to fatness; (2) fair, thin, clear skin, long eyelashes, fine hair, pearly teeth, bright, refined, "delicate" look. These so-called typical appearances are of very doubtful diagnostic value. Dyspepsia very common. *Diagnosis.*—The great question is, "What justifies the surgeon in terming a certain patient 'scrofulous?'" The answer

¹ Read Paget on Senile Scrofula, in his Clinical Lectures.

usually depends greatly on the surgeon's individuality. By some authorities such a thing as scrofula is hardly admitted to exist; all the appearances associated with its name being referred to local or special causes. Usually, any such morbid manifestations as have been catalogued above, if the known exciting cause is trivial, or if no cause at all be known, are regarded as scrofulous; and especially if more than one such affection attack the same individual, and if he present the peculiarities of personal appearance mentioned above. *Prognosis*.—Under treatment, with moderately favorable conditions, the individual manifestations usually disappear, often leaving ugly scars. But the diathesis almost always remains. It may lie latent throughout a vigorous manhood, and reappear in a decrepit old age. Danger of tuberculosis supervening: said to be greatest in fair, delicate, or "sanguine" type of the scrofulous. *Treatment*.—Hygienic and medical, general and local. Hygienic requires the various conditions usually considered "strengthening," fresh air, good food, dry lodging, daylight, cheerful occupation, flannel clothing, moderate exercise. Cleanliness of head and skin. Strict attention to each trivial ailment. Medical treatment is (1) antidyseptic, and (2) tonic and nutritive. Tongue, stomach, and bowels must be attended to on general principles. Gregory's powder and hydr. c. cret. often useful, especially in children. Sodæ bicarb. (grs. x.-xv.) ter die in inf. calumbæ just before meals. Cod-liver oil is the remedy. Give it after meals, 3 j. bis die, increased gradually up to 5 j. ter die. Occasionally suspend its administration if it disagree with stomach. Small doses of nitric acid and strychnine useful adjuncts (Williams quoted by Savory). Iron, ammonio-tartrate, citrate, fresh carbonate, vinum ferri (iodide of iron, in fat, flabby children). Iodides sometimes mischievous if fever be present. Mineral acids. Quinine, tinct. cinchonæ co. Pancreatic emulsion. Change to a new climate, which, whether warm or temperate, should certainly be dry; English watering-places, Margate, etc.; Madeira, sea voyage. Local treatment is given under special heads. In old age, "iron, cod-liver oil, sea air, etc., of little potency. Rest, warmth, and good food more important" (Paget).

Scrotum.—*Wounds* heal very readily. *Bruises* often produce hæmatocele, *quod vide*.

Scrotum, Diseases of.—The scrotum, consisting as it does chiefly of skin and cellular tissue, is liable to the ordinary cutaneous diseases. Moreover, inside its serous lining are found hydroceles, hæmatoceles, hernias, and diseases of the testicle. Certain affections of the scrotum present special features worthy of note. The chief of these are (1) inflammation, (2) elephantiasis, (3) epithelioma.

SCROTUM, INFLAMMATION OF, is remarkable for the amount of oedema which accompanies it, for its usually diffuse character (a kind of erysipelas), and for its frequently ending in partial sloughings. Its usual causes are extravasation of urine, or continued irritation of some trivial local af-

fection. *Prognosis* in every way good, except in bad cases of extravasation. *Treatment*.—*Vide* ERYSIPELAS, and URINE, EXTRAVASATION OF.

SCROTUM, ELEPHANTIASIS OF.—A cellulo-cutaneous hypertrophy, with more or less oily infiltration. Very rare except in the East and West Indies, in Egypt, and in South America. Prime cause unknown. Exciting cause, occasionally some local irritation. The tumor may even attain a weight equal to that of all the rest of the patient, trunk and limbs inclusive. *Surface* sometimes smooth, sometimes tuberculated. *Prognosis*.—Steady growth. Perhaps eventually death from supervening ulceration. *Treatment*.—Excision. If under forty-two pounds in weight, try to dissect out and save testicles and penis. Danger of great hemorrhage.

SCROTUM, EPITHELIOMA OF (CHIMNEY-SWEEP'S CANCER).—Chiefly attacks chimney-sweeps. Commences as a wart or tubercle "oftenest near the lower and fore part" of scrotum (Humphry). Structure that of epithelioma elsewhere. *Treatment*.—Excise. Decidedly enlarged glands in groin should be excised too. Very little tendency to affect the system, but great tendency to recurrence. Irritation of soot has been known to produce epithelioma on hand of a gardener.

Scurvy.—Believed to be a blood disease. *Causes*.—Salt meats. Want of fresh meat and fresh vegetables. Subsidiary causes are severe cold, and all depressing influences. "In former Arctic expeditions scurvy occurred in men who indulged to excess in alcohol, and who had not been exposed to the deteriorating conditions that existed during sledge-travelling."¹ *Morbid Anatomy*.—Extravasations all over the body, beneath skin, in serous cavities, in viscera, and in intermuscular spaces. Extreme emaciation. Ulcerations. *Symptoms and Course*.—Premonitory signs, great lassitude, pains in joints. Then appear sore mouth, petechiæ, and, by and by, ulcers and blood-tumors. Hemorrhages of various kinds, internal and external; progressive exhaustion. *Prognosis*.—Fatal, unless the causes be removed. Proper treatment rescues very bad cases indeed. *Treatment*.—Vegetables. Fresh meat. Lime-juice. Best attainable hygienic conditions. Treat local manifestations on general surgical principles. Owing to impossibility of melting lime-juice on sledge excursions in polar regions, concentrated lime-juice lozenges have been devised.

Septicæmia.—A disease in which the blood is poisoned by septic matter. In this respect it does not differ from pyæmia, and many if not all cases of surgical fever. Bryant even writes, "Surgical, suppurative, or traumatic fever; septicæmia, ichoræmia, puerperal fever, and pyæmia, may all be considered as so many different names for, and manifestations of, one condition, blood-poisoning." In practice, however, "surgical fever," "septicæmia," and "pyæmia" are not considered as different names for one

¹ Report of Committee on Scurvy, in Sir George Nares' expedition, quoted by Mr. H. Leach.

condition, though it is difficult to define the limits of each. I have most often heard surgeons apply the term septicæmia to acute cases in which the nervous and digestive organs were the seat of prominent symptoms, while there was an absence of clear signs of secondary abscess. Compare with pyæmia. *Causes.*—*Vide* Pyæmia. *Signs.*—Apathetic state; rarely excitement. Tongue very dry. Speech feeble. No appetite. Either perspiration or dryness of skin. Symptoms often bear considerable resemblance to those of typhus. Urine scanty. Temperature, at first high, tends to fall as death approaches. Occasional extreme rapidity of rise.¹ Bed-sores form; urine and fæces are passed in bed. Finally collapse and death. The elevation of temperature is often slight, especially in weak, old people. Chronic blood-poisoning is more likely to take one of the forms of pyæmia or the form of hectic fever. *Pathology.*—Condition of the blood not at all characteristic. “If we have not seen the patient during life, we shall often examine the dead body in vain for some palpable cause of death” (Billroth). Spleen often enlarged and softened, rarely normal. Liver congested and very friable. “In the heart the blood is lumpy, half-clotted, tarry, and rarely firmly coagulated, buffy; in most cases the lungs are normal. Where the course of the affection ‘has been very long (a fortnight or more) the disease shows itself mostly by extensive suppuration of the cellular tissue’ (near the wound), ‘with more or less extensive gangrene of the skin’” (Billroth).² *Prognosis and Treatment.*—*Vide* PYÆMIA.

Shock.—*Causes.*—Injuries, especially if very painful, or attended with hemorrhage; or if in certain localities, *e.g.*, abdominal viscera, testicles, and the larger joints. Mental emotions. When an injury is foreseen and expected, shock is more severe than when the recipient is excited and careless. Children less liable than adults. But acute pain readily causes collapse in a few hours in children (H. Marsh). *Signs.*—Pallor, coldness, weakness, even amounting to utter prostration. Consciousness may or may not be seriously affected. The mind may be clear, and yet the limbs but little sensitive to pain. Temperature actually sinks 2°, 3°, or 4°, or more in severe cases. Pulse thread-like. Respiration sighing. Nausea, vomiting. In certain cases the patient is noisy and delirious. Generally he is either quiet or wanders slightly in his mind. *Course.*—Death may result almost instantaneously, even when the prime injury is apparently trifling. This is most common in injuries to the abdominal viscera. But reaction usually occurs in a few hours, and is frequently excessive, passing into fever. And, again, shock may endure for many hours, and at last prove fatal. *Pathology.*—It is certain that paralysis of the vaso-motor

¹ From 102.6 to 107 in ten minutes in a case under Mr. Bickersteth (British Medical Journal, 1879).

² See Microscopic Organisms, in Appendix.

nerves, probably inhibitory, is an essential part of shock ; but it is not so certain whether it is universal or local. Golz showed that when a frog is struck on the abdomen, its heart ceases to beat, and at the same time the portal system is vastly distended with blood. He supposes the former phenomenon to be the effect of the latter, and the two together to account for the features of shock ; but Moullin argues, and with reason, that, in shock, there is primarily a far more general inhibition of the vaso-motor system. *Diagnosis* from syncope, the result of hemorrhage.—When the hemorrhage is internal, this diagnosis may be impossible at first ; but in the case of hemorrhage, when reaction takes place, the pallor of the gums and conjunctivæ persists. *Prognosis* depends on the amount, on the persistence, and on the attendant complications of the attack. A particularly dangerous condition is that termed “prostration with excitement,” in which “the languor or stupor of collapse is succeeded by restlessness, jactitation, tremor, and twitchings of the muscles, precordial anxiety, often but not always delirium of various degrees” (Savory). *Treatment*.—Warmth, hot water bottle to feet, flanks, and epigastrium, warm affusion to head. Horizontal position. Frictions. Stimulants : brandy, ammonia. Do not pour fluids down a patient unable to swallow. Galvanism to præcordia. Treat hemorrhage if present. Remember that collapse in some cases of internal hemorrhage is useful, by giving time for nature to close the bleeding vessels. In such cases the treatment had better be limited to horizontal posture, strict quiet, external warmth, and such action as the bleeding may demand. Transfusion. When reaction has commenced, food must be given, *e.g.*, small quantities, frequently repeated, of brandy and egg mixture, milk, and strong soup. With regard to operating during shock, the surgeon seldom hesitates now, relying upon the stimulating powers of ether and the relief from pain and discomfort which follows the removal of a mangled limb. But every care must be taken to prevent hemorrhage, which is very badly borne by a collapsed patient.

Sinus.—An abnormal passage whose length decidedly exceeds its diameter, and which is not a healthy, healing wound. Paget, in describing *sinus* and *fistula* together, says they include three classes, viz. : (1) long, narrow, suppurating canals ; (2) canals giving exit to unnatural secretions (*e.g.*, gastric fistula, biliary fistula) ; (3) abnormal apertures between mucous cavities (*e.g.*, vesico-vaginal fistula). He goes on to say that “if a distinction is to be made between the terms,” “sinus” should be applied exclusively to those of the first form, in which the canal has but one opening. To thus limit the term “sinus,” would be to differ from many surgeons (*vide, e.g.*, Pott’s *chirurgical works*, p. 590, where “sinus” means either blind or complete fistula). *Causes*.—Usually (1) abscess, sometimes (2) wound, (3) ulceration, (4) sloughing. In addition to these, one or other of the following secondary causes almost essential, viz. : (1) presence of dead bone, or of foreign body, (2) some mechanical obstruction to the free

discharge of pus, (3) the occasional passage of secretions or excretions into the sinus, (4) presence of diseased glands (strumous or otherwise). Passage of sinus among muscles is a cause which may be classed with (2). *Treatment*.—Find out and treat cause. Sayre's vertebrated probe useful when track is sinuous. Remove dead bone, etc. Slit up, if situation of sinus permits. Injections of iodine, tannic acid, Condy, etc. Antiseptic bougies. Pressure. Drainage by passing a tube *nearly* to the bottom of the sinus. This can be combined with injection. Withdraw slightly each day. Cautery, especially galvanic or benzoline cautery. If the sinus pass among muscles, and cannot be slit up, the attachments of these muscles should be fixed by bandages, etc.

Skin, Diseases of.—See ECZEMA, ECTHYMA, PSORIASIS, CORNS, WARTS, ELEPHANTIASIS, SCABIES, etc., etc.; only the commonest forms are noticed in this work.

SKIN, TRANSPLANTATION OF.—(1) Minute pieces of epidermis, which should include the youngest layers, namely, those next the true skin, are shaved or cut off and placed upon the surface of a healing ulcer, in order that they may there form nuclei whence cicatrization may spread. (2) Skin is sometimes only partially severed from its connections, and then, with the circulation still active within it, transferred to the raw surface of another part. In this way, *e.g.*, gaps in the skin of the chest may be filled in from that of the arm. Of course the arm has to be bound to the bosom until the skin has formed adhesions in its new site. (3) Pieces of skin, even of considerable size, thoroughly cleaned free of subcutaneous tissue, have been successfully transplanted without any pedicle being left attached to them (*vide* papers by Wolff of Glasgow). In the first (far the commonest) method it is enough to place a small piece of gutta-percha tissue over each transplanted fragment, and to cover with water-dressing.

Skull, Injuries of.—See HEAD.

Sloughing.—See GANGRENE.

Snake-bites.—See BITES OF SNAKES.

Snuffles.—See SYPHILIS, CONGENITAL. (In Appendix.)

Spectacles.—See EYES. (In Appendix.)

Spermatic Cord.—Frequently affected secondarily to the testicle, *e.g.*, by cancer. Subject independently to hydrocele (*quod vide*), hæmatocele, lipoma, neuralgia, etc.

Spermatorrhœa.—An abnormal discharge of semen. A chronic disorder. Nocturnal emissions, if not oftener than once a fortnight, scarcely considered abnormal. *Cause*.—Almost always masturbation. *Symptoms*.—Niemeyer describes four classes of cases: (1) persons who have unnatural emissions simply because they continue to masturbate. To their doctor they describe such symptoms as "nervousness," lassitude, palpitation, various exaggerated pains about the genitalia, etc. They readily confess that they have practised self-abuse, but pretend they have given it up.

(2) Robust-looking persons who have really given up their bad habits and recovered their general health, but who are sexual hypochondriacs for some other reason. (3) Weakly, anæmic persons, who have never masturbated, and in whom ordinary and not frequent wet-dreams produce dulness and lassitude. (4) True cases of spermatorrhœa, in which exhaustion, etc., are really produced by too frequent seminal losses. Their symptoms are as follow: sadness, dislike to work, lassitude, inattention, cowardice, tremblings, noises in the head, dizziness, neuralgic pain in back of head, etc. Resemblance to hysteria. In these cases especially, semen often flows away with the urine or during defecation. But note, the latter symptom is not uncommon in healthy men. Distinguish between mere mucus and semen by the microscope, which in the latter case should discover spermatozoa. *Pathology* of the last form (true spermatorrhœa).—Probably a state of chronic congestion and relaxation about the prostatic part of the urethra and the openings of the seminal ducts, added to an undue irritability of the nervous system; in fact, a condition similar to the hysteria caused in women by ulceration of the os uteri. *Prognosis*.—Cure difficult in many cases, (1) because patient will not refrain from bad habits, either of self-abuse, of alcohol-drinking, of excessive meat-eating, of lying in bed in the morning, or of sedentary employment without proper outdoor exercise; (2) because of chronic nature of ailment. *Treatment*.—Insist upon total abstinence from the vices just enumerated. The difficulty of stopping masturbation is well known. It seems to me that the most rational indication is to be derived from its being essentially a secret vice, practised chiefly or entirely in bed. A patient who eventually lost his reason through it, even when the habit was inveterate, always ceased from it so long as his attendant slept in the same bed with him. The sex of the bed-fellow does not affect the result, therefore marriage may be advisable. Occasional intercourse with lewd women, which has been recommended even by physicians, is of somewhat doubtful value, and of course morally objectionable. Cold hip-baths in the morning. Patient should get up and empty his bladder as soon as ever he awakes in the morning, even if he gets into bed again. Hard mattress. No supper; no tea in evening. Attend to digestion. Revalenta Arabica, or fish and milk diet may be useful. Keep bowels open. Blisters to perinæum. When varicocele or relaxed genitalia coexist, patient should wear my suspensory bandage, made by Arnold, of West Smithfield. If improvement be not satisfactory, cauterize prostatic part of urethra with Lallemand's "porte-caustique." Repeat three or four times if necessary. Drugs given are (1) belladonna, gr. $\frac{1}{4}$ of extract, + zinci sulph., gr. iiss., ter die; (2) bromide of potassium. Phosphorus, quinia, strychnia, iron, and cantharides are given when spermatorrhœa is associated with impotence.

Spine, Diseases of.—Term "spinal disease" sometimes restricted to caries. Angular curvature is, of course, always described with caries. Be-

sides the above, there are lateral and antero-posterior curvatures, hysterical and rheumatic affections, and spina bifida.

ANGULAR CURVATURE; POTT'S CURVATURE OF THE SPINE; CARIES OF THE SPINE.—These three terms are not quite synonymous, but they are constantly used as such. Caries precedes and causes the curvature. *Causes.*—Scrofulous constitution—male sex in children, female sex in young adults, rare in more advanced life. Often a history of a fall or blow.¹ Whooping-cough. *Pathology.*—Commences either as simple caries, or as tuberculous disease of the vertebral bodies, or as inflammatory softening of the intervertebral cartilages. As the destructive process proceeds, two striking effects almost always result, viz.: (1) a posterior angular projection of the corresponding spinous processes; (2) less frequently, formation of abscess. As many as six or eight vertebral bodies have been known to break down: usually only two or three are involved. Laminae, spines, and articular processes escape; but there is a great tendency for them to ankylose together. Collapse of the spine anteriorly at the seat of caries causes the posterior angular projection. Compensatory curvatures in other regions of the spine. Curvature in lumbar disease occasionally lateral as well as antero-posterior. Middle and lower dorsal regions commonest seats of caries. Spinal cord is (1) so small as compared with diameter of spinal canal, and (2) so well protected by its membranes, that it is usually unaffected; but in many cases *paraplegia*, usually motor and partial, and often temporary, occurs. The immediate cause is probably inflammatory effusion, or else pressure from a sudden rapid increase of the deformity. Even aorta may be compressed between the diseased vertebræ as the latter fall together.² *Abscess* usually “*psoas*” in disease of dorsal or lumbar vertebræ. Frequently lumbar. In cervical caries, abscess usually presents toward side of neck, sometimes in pharynx (retro-pharyngeal abscess). But the pus may burrow in various directions, *e.g.*, into pelvis, buttocks, abdominal wall above Poupart's ligament, and from the neck into the thorax. *Psoas abscess* passes down in the sheath of the *psoas* muscle, forming a swelling first in the inguinal region of the abdomen, and next in the thigh beneath Poupart's ligament, toward the outer rather than the inner side of Scarpa's triangle. It may extend downward much farther, and occasionally turns outward or inward. Sometimes it is double, *i.e.*, passes down the sheaths of both *psoas* muscles. *Lumbar abscess* perforates the quadratus lumborum, and presents in the loins immediately external to the erector spinæ. Spinal abscess may (1) be absorbed, or, (2) after a more or less chronic

¹ See a paper by Mr. Willett in St. Bartholomew's Hospital Reports, vol. xiv., p. 325. Out of 60 cases, the assigned cause was a blow or fall in 21 cases, previous illness in 5, and cause unknown in the remaining 34; 14 were strumous subjects; that is, were sickly, delicate persons of strumous aspect.

² See Goodhart, Pathological Transactions, 1878.

course, burst, or (3) be opened by the surgeon. When opened, unless antiseptic precautions be taken, hectic fever supervenes. When ankylosis takes place, even the laminae and spinous processes of adjacent vertebrae unite. *Symptoms*.—In children, the first sign observed is generally a prominence of one or more vertebral spines; but if the lumbar region be affected, no prominence may be discovered till after the appearance of abscess, or signs of general or local weakness and pain. Adults usually remark pain and weakness before deformity. The erector spinae, rigid at first, soon atrophies. Deformity varies in extent from the slightest degree up to a huge “hump.” Compensatory curves in the lumbar and cervical regions make the chin project and the head sink down beneath the shoulders. To take weight off spine, patient supports himself with his hands on his knees. When picking up an article from the floor, he squats down, keeping the affected part of his back rigid. If the atlo-axial joint be affected, he turns his body to the right or left instead of rotating his head. Pain may be absent. In acute cases pain and tenderness are excessive. Often more pain is felt in the side or abdomen than in the spine. Paraplegia may come on, or temporary want of control over the sphincters. Incapacity for and dislike to active exercise: health suffers in consequence. When abscess opens and chronic septicaemia results, health may break down rapidly, or abscess may dwindle to a comparatively unimportant sinus. *Diagnosis*.—Usually easy. Difficult (1) at commencement, (2) when it occurs in hysterical females. A lateral curvature often results from caries of the lumbar vertebrae; but, in this case, there is no rotation, as in true lateral curvature, and there are probably collateral signs of caries, *e.g.*, abscess. Some persons attach importance to eliciting pain by concussing the top of the head, or by running a hot sponge down spine. Stiffness of spine an early sign. *Prognosis*.—Favorable as regards life when proper treatment is adopted. Prospect of undoing angle of curvature hopeless. Paraplegia is frequently recovered from. *Treatment*.—Three classes—(1) rest in bed, (2) movable supports, (3) fixed supports. Also general treatment. Rest in bed essential in the worst cases, *e.g.*, those complicated by paraplegia and abscess; but it is itself injurious, by taking away the benefits of fresh air and exercise, and even when in bed the spine should be securely fixed. Spinal supports are of various kinds. If an apparatus be applied, it should be frequently examined and adjusted. Fixed apparatus, plaster-of-Paris, poro-plastic, leather, paraffin, etc. To Sayre is chiefly due credit of demonstrating their value. He uses bandages with plaster-of-Paris, applying them from below the anterior superior iliac spines up to the armpits, while the patient is suspended by a collar beneath the chin and loops in the axillae, his toes only touching the ground. The bandages are made of crinoline. Pads of cotton-wool over epigastrium, female breasts, and prominent spines. Tight-fitting jersey next skin. Patient lies horizontally for an hour after application of jacket (longer if convenient). Similar ap-

paratus applied with patient in supine position (Walker),¹ or suspended from the armpits and hips in prone position (Willett), or in hammock (Davy).² Patient's complaints as to pain, etc., should be attended to, lest a sore form from pressure over projecting spines. The suspending rope should be held by hand, as grown-up people sometimes faint, and require instantly lowering to the horizontal, and little children might get hanged if hooked up and left. Case should be cut up at least once in three or four months; six months minimum of treatment. With a Sayre's case, exercise and play become enjoyable in cases where walking had previously been impossible. In case of pain near the prominent spine, cut a trap-door in the case. When the cervical region is affected, the head should either be suspended from a jury-mast, or supported by a leather collar, well moulded to the chin, occiput, and base of the neck. Use the jury-mast also in upper dorsal cases. Constitutional treatment is conducted on general principles. Cod-liver oil, Parrish's food, sea-side, fresh air, sufficient diet, repose, etc. Abscess.—Its opening should be delayed as long as possible; and then strict antiseptic treatment should be carried out.

SPINE, LATERAL CURVATURE OF.—In practice the lateral curvatures which sometimes result from empyema or from lumbar caries are not included under this head. *Causes*.—Muscular weakness and excessive sitting or standing in a lounging position about the age of puberty. Female sex much more than male. Inequality in length of lower extremities. Rickets. Rachitis adolescentium. (See KNOCK-KNEE.) *Pathology*.—Always a primary and secondary, sometimes a third and fourth curve. Lumbar curve has its convexity to the left nine times out of ten. Lumbar and dorsal curves together form a line like the italic *S*. Simultaneous rotation of vertebræ, so that in each curve the bodies of the vertebræ which form it are turned toward its convexity. Hence the actual extent of lateral curvature of the bodies is greater than the apparent amount of curvature noticeable by merely examining the spines. Hence, also, the transverse processes on the side toward the convexity are twisted backward, while those on the side of the concavity turn forward. Thorax is rotated forward and compressed on the concave side, and rotated backward and dilated on the convex side of the dorsal curve. Waist sinks in on concave side of lumbar curve and disappears on the opposite side, where its place is taken by a depression half-way up the thorax. Thus in an ordinary case of lateral curvature we should notice, (1) in the middle line, the row of spinous processes curved with the lumbar convexity to the left and the dorsal to the right; transverse processes prominent on the convexities, sunk in on the concavities; (2) on the left side, the waist bulging, a spurious waist caused by a depression in the thorax, and the thorax itself prominent anteriorly,

¹ See British Medical Journal, December, 1878.

² See St. Bartholomew's Hospital Reports, vol. xiv.

flattened posteriorly, and compressed throughout; (3) on the right side the shoulder prominent ("growing out"), the thorax dilated and forming a large swelling posteriorly, the waist sunk in, and the hip prominent. In bad cases the last rib on this side impinges on the iliac crest. It is extremely likely that the immediate cause of lateral curvature is a softened state of the bones due to an affection of the epiphyseal cartilages, like that which causes knock-knee. The curvatures become confirmed by the bones themselves altering in shape, atrophying where the pressure is increased, hypertrophying where the pressure is taken off. *Signs* are essentially the naked-eye appearances which result from the changes just described. *Diagnosis*.—See ANGULAR CURVATURE. To distinguish structural from temporary lateral curvature, make the patient bow down low. In the former case the curve in the back persists. *Prognosis*.—Difficulty of cure very great. Severe cases of any duration very nearly hopeless. Even commencing cases require most vigilant management. *Treatment*.—Various plans. Almost all endeavor to combine extension, exercise, and localized pressure. Many forms of spinal support. Sayre's plaster case. Gymnastic exercises, especially swinging by the hands. Standing and sitting are to be avoided. Rest should be taken in the horizontal position. Attend to general health. Tonics; fresh air. Treat menstrual irregularities. Of course, search should be made after any possible exciting cause, and its removal effected if possible. Friction to restore tone to spinal muscles. According to my experience, Sayre's treatment at least prevents bad curvatures from getting worse, greatly improves moderate ones, and even cures incipient cases; but daily extension by collar and pulleys is essential.¹

SPINE, ANTERO-POSTERIOR CURVATURES.—*Lordosis, Kyphosis*. Sometimes arise from causes precisely analogous to those of lateral curvature. Frequently secondary to hip disease. In lordosis the concavity is posterior, in kyphosis it is anterior. *Treatment*.—Drilling, careful exercise, with intervals of abundant horizontal repose. Attention to posture. Treat rickets if present. In these cases, Sayre's plaster corset combined with daily extension should be employed for a considerable time, then left off gradually, the intervals of wearing it being occupied in judicious exercises, frictions, careful attention to carriage, and abundance of horizontal rest.

SPINE, HYSTERICAL.—Sometimes simulates spinal caries in young women. Spasms, paralysis, difficult micturition, local tenderness. But "tenderness is excessive and superficial, so that the patient flinches, and complains more when the skin is pinched than when the vertebræ are pressed."² There is never found the stiffness characteristic of spinal caries. No proportionate general wasting. Probably weak circulation and uterine or ovarian disorder. *Treatment*.—See HYSTERIA.

¹ I speak confidently on this subject, for I have now taken a part in the application of nearly seven hundred plaster jackets.

² See Savory, in Holmes's System, vol. i., p. 381.

SPINA BIFIDA.—*Causes.*—Defective development and non-union of vertebral laminae and spines, usually in lumbar region. Excess of cerebro-spinal fluid in fetal life, according to Lowne. *Pathology.*—Perhaps primarily a local inflammatory dropsy of spinal meninges. At all events, these membranes bulge through defect in spinal canal. Spinal cord or spinal nerves often in the tumor (when present, always in middle line, though often widely spread). Dura mater and arachnoid blend with skin. *Symptoms.*—A fluctuating tumor in median line behind, usually in lumbar region, sessile or pedunculated, often translucent, springing from the bones; may be partially reducible by pressure—such pressure may cause spasms or convulsions. May swell when child cries. Skin thickened and rough or thin and bluish red. *Diagnosis.*—It is usually easy to see that a true spina bifida is one. It is not always easy to be certain that a cyst closely connected with the bones is not one. Compare each case with the signs just detailed. *Prognosis.*—Grave. More hopeful when the neck of tumor is very narrow. *Treatment.*—(1) Palliative, (2) radical. Palliative: a leaden shield, well padded and accurately fitting. Radical: three forms, viz., (1) injection with iodine, (2) pressure, (3) excision. Operation very dangerous; and surgeon should be content with palliative measures, unless tumor is getting steadily worse or on point of bursting. Pedunculated tumors offer best prospect of success from injection. An endeavor should be made to isolate sac from general cavity of spinal membranes during injection. Sometimes long-continued pressure, *e.g.*, by Dupuytren's enterotome, will effect this isolation permanently, and thus cure the case. To inject iodine, a part of the fluid should first be drawn off, and then two drops of pure tincture of iodine injected (*see* Holmes's "System," vol. v., p. 806). Repeated aspiration may be tried without injection. Morton of Glasgow has been very successful with the following injection: iodi., gr. x.; pot. iod., gr. xxx.; glycerini, $\frac{5}{8}$ j. About 3 ss. to 3 ij. is injected through a medium-sized cannula. Repeat if necessary. Avoid unnecessary escape of spinal fluid.

Spine, Injuries of, include dislocation, fracture, and sprain. With these should be studied concussion, traumatic compression, and traumatic inflammation of the spinal cord and its membranes.

SPINE, DISLOCATIONS OF.—*Causes.*—Usually indirect violence, *e.g.*, the back being violently bent forward by a soft body falling on the head of a person stooping. Occasionally direct violence, or even (in atlo-axial region) destruction of the ligaments by disease. *Usual Situation.*—Lower cervical region. *Direction.*—Upper vertebra is almost always displaced forward. *Signs.*—Mostly "rational" and indirect. The most important depend on injury to the cord: paralysis of parts supplied by nerves given off below seat of injury. Perhaps local pain and tenderness. Shock: collapse at first. In some cases manifest deformity. *Variations in Symptoms according to Seat of Injury.*—(1) Dislocation in lower lumbar region. As a rule, merely partial paralysis of lower limbs or pelvic organs from partial in-

juries to cauda equina ; (2) upper lumbar region—paralysis of lower limbs and sphincters ; (3) lower dorsal—paralysis of abdominal wall also ; (4) upper dorsal—impaired breathing from paralysis of intercostals ; (5) lower cervical—paralysis of every part below neck except diaphragm, respiration entirely diaphragmatic ; (6) above third cervical vertebra, *i.e.*, above origin of phrenic nerve—instant death. Of course the higher lesions include all the paralytic effects of the lower. Priapism. Later symptoms : alkalinity of urine and catarrh of urinary organs ; bed-sores. These last-mentioned complications cause death eventually. But, in cervical dislocations, death results from obstruction of the lungs by frothy secretion. *Diagnosis*.—From (1) fracture, hardly possible. From (2) mere concussion, by sudden onset and by nature of cause ; also by deformity when there is any. *Prognosis*.—Its badness varies directly with the height of the vertebra displaced. High cervical dislocations perish usually in from two to three days, dorsal in two or three weeks. But dorsal may recover, lower dorsal frequently. Lumbar offer hopes even of complete cure. *Treatment*.—Rest on back. Gentle examination and nursing. Gentle extension. Withdraw urine twice daily ; wash out bladder if urine become alkaline (*see* BLADDER, CATARRH OF). Attend to bowels with enemas. The nursing is of vital importance. Smooth, clean sheets, gentle change of position, dryness, daily examination of sacral and trochanteric prominences. Good food. Trephining is for the most part condemned. In certain cases of injury to the spine, especially if in lumbar region, it would be justifiable to apply a plaster-of-Paris corset during extension. Sayre has published a case of this sort.

SPINE, FRACTURE OF.—Almost everything written above of *dislocations* is applicable to *fractures*. In practice it is very seldom that any distinction is or can be made during patient's life. *Seat*.—More frequent in the cervical region, but common enough in the dorsal.

CONCUSSION OF THE SPINE.—A term applied to a variety of traumatic affections which can easily be differentiated *post mortem*, and sometimes more or less easily diagnosed during life. They concur in having one common cause, and in tending, so far as the worst cases of each kind go, toward similar, if not identical, terminations. The common cause is injury to the cord without fracture or dislocation of the spine. The worst termination is disorganization of the cord with consequent paralysis. Fortunately most cases stop short of this. Conditions included in the term "*Concussion of the Spine*."—1. Mere concussion. 2. Compression from hemorrhage or effusion. 3. Laceration. 4. Inflammation. *Causes*.—Injury, direct or indirect, to the spinal column. Especially common in railway accidents. Blows, falls. *Pathology*.—Amount of visible injury in the cord varies from slightest swelling or ecchymosis to considerable contusions, lacerations, ecchymoses, effusions, and hemorrhages. Membranes of cord suffer also. Ligaments of spinal column sometimes sprained or torn. At a later stage are found softenings and thickenings, and, still

later, atrophy or disintegration. *Signs*.—The most serious symptoms arise much more from secondary inflammation than from the injury itself. Concussion may be localized or diffused. When the injury is localized to one part of the cord, either (1) the rational symptoms are confined chiefly to paralysis or irritation of the nerves arising from that part, or (2) the local mischief is severe enough to damage the functions of all the cord below seat of injury. But the smallest local injury may serve as the starting-point for the gravest general disease. In diffused or general concussion the signs are often remarkably vague and insidious. Earliest are lassitude, irritability, "inaptitude," sleeplessness. Then come pains and numbness in various parts. Next, fixed pain in the back and rigidity of the spine announce definitely the presence of spinous or intra-spinous inflammation. Then uncertain gait, general clumsiness, disorders of sight, hearing, taste, or smell, mental confusion, paralysis. *Diagnosis*.—(1) From fracture or dislocation of spine (*see* DISLOCATION OF SPINE). The symptoms are usually less decided, less sudden, and less severe. (2) From malingering. Sometimes very difficult. Attach greatest weight to objective symptoms, but notice if any of these vary when patient is off his guard. Cross-examine about subjective symptoms; but gross exaggeration is not uncommon even when real concussion is present, so the detection of one falsehood proves little. Test by galvanism. Muscles really paralyzed do not contract properly under galvanism. Extensor muscles usually most affected. *Prognosis*.—When symptoms last long and are extensive, recovery is very unlikely. *Treatment*.—The most trivial case deserves complete rest in horizontal posture till the symptoms have entirely passed away. Prone position preferable. Moderate or low diet. No stimulants. Calomel, gr. v.-x. When local pain or tenderness is present, dry cupping. Ice-bags. Pot. bromid. and chloral hydrat., gr. xx.-xxx., at night. Later stages: Mercury, *e.g.*, liq. hydrarg. perchlor., 3 j. t. d. s.; or pot. iod. Counter-irritation over spine, blisters, etc. Still later, when active disease in the spine seems to have passed away while its effects remain, employ strychnia, tonics, exercise—passive or active—shampooing, galvanism.¹

SPINAL CORD, TRAUMATIC INFLAMMATION OF, and SPINAL CORD, COMPRESSION OF, are noticed as secondary phenomena occurring in the course of a case of *Concussion of the Spine* (*see* above).

Sprains.—A class of injuries in which the soft parts of and about joints are stretched or torn. *Causes*.—Usually a sudden wrench or twist

¹ I would venture to suggest that in the case of many patients, especially those with trivial concussion, who will not keep the prone position, *e.g.*, fractious children, and in the case of other patients convalescing, a plaster-of-Paris jacket would be useful. Certainly nothing does so much good to the very common injuries of the joints of the limbs to which children are subject; and many cases of so-called "spinal concussion" must be primarily sprains of inter-vertebral ligaments, while other cases would benefit from thorough local rest.

occurring when the patient is unprepared to bring his muscular power to the assistance of his ligaments. Sprains not unfrequently accompanied by fracture, the tendons or ligaments in such cases being stronger than the bony processes to which they are attached. Complete rupture of a tendon is commonly described as an accident distinct from a sprain (*see* TENDONS, INJURIES OF). Most sprains of severity involve laceration of the capsular ligament. Blood is rarely effused into the joint in any quantity, but subcutaneous ecchymosis is very common. Serous effusion into joint-cavity, and inflammatory swelling of surrounding soft parts, take place. Pain, often excruciating, heat, and tenderness—usually best marked at certain points. *Diagnosis* is to be made from fracture by negative evidence. Trust as much as you safely can to your eye, and to the history of the case. Prolonged physical search for crepitus to be much condemned. *Treatment*.—Methods apparently diametrically opposed succeed with these injuries. In the great majority of cases nature is thoroughly competent to cure sprains unassisted. Many people “walk them off,” as they say. Sprained thumbs habitually get what is really no treatment at all; yet, common and severe as they are, how rarely any permanent harm comes from them! On the other hand, almost all the surgical authorities, alarmed by the number of joint diseases and the like which are attributed (truly, no doubt) to neglected sprains, warn us to fix sprains with wooden or iron splints for weeks. There may be some doubt about the amount of harm to be really attributed to treating sprains by motion; but there can be no question whatever about the mischief done by the abuse of rest. Bone-setters depend for their living upon the orthodox and blind worship of splints. A treatment which will be found very successful (*see* the writings of Hood, Cowling, Pilcher, and the traditional practices of thousands of the laity) is to supply the place of the torn ligaments by applying carefully and thoughtfully bandages outside the joint, to limit effusion and inflammation by the pressure of such bandages, and to secure elasticity, and thus permit a certain amount of movement, by means of plenty of good cotton-wool, or else by using india-rubber bandage, which probably fulfils all the above indications better. This india-rubber bandage, if properly applied, gives great relief in cases of flat-foot, the pain of which arises partly from a kind of chronic spraining of ligaments and tendons. When the sprain is severe, complete rest for a few days may be desirable, and *severe* exercise should certainly never be allowed till it is quite well. The mobile treatment prescribes, or rather permits, only gentle, regulated, limited movements; and what it chiefly condemns is the continual and repeated resort to splints.¹ Under such a treatment it sometimes happens

¹ Billroth. Sir James Paget says: “In deciding upon resorting to manipulation in old cases, I believe you will be safe if you will take the temperature of the part for your guidance.” Rest is counterindicated when the joint is cold.

that each fresh walking experiment reveals a worse and worse state of things; the patient goes to the bone-setter, submits to a little violence, courageously defies his doctor's warnings, walks about, and gets well. When the treatment above sketched fails, as it will sometimes, then is the time for putting on a plaster-of-Paris case. The perfect recovery of old sprains is often prevented by the presence of adhesions in or about the joint. Break down these by free movements. If inflammatory reaction is feared, fix up the limb for a few days and apply an ice-bag.

Sterility.—In males, usually a consequence of *impotence, quod vide*. But there are probably cases in which men perfectly virile are yet sterile. No rules can be given for the treatment; but if the surgeon should be consulted on such a case, he should inquire carefully into it, and possibly he may do good—even if it be only by finding that the patient is not really sterile at all.

Sternum.—Liable to necrosis from syphilis, from struma, or from injury. This may lead to abscess and perforation, and occasionally to mediastinal abscess. *Treatment.*—Apply general principles, for which see BONE, NECROSIS OF, and SYPHILIS, etc.

Synovitis.—See JOINTS.

Syphilis.—Former extended application of the term so as to include all venereal diseases, even gonorrhœa. In modern language usually restricted to the constitutional disease, and to such primary sores as are followed by infection of the system. But it is considered natural and convenient by most writers to place together, for descriptive purposes, the soft non-infecting chancre and the “hard” or “Hunterian” chancre with its consequences. The same plan will be followed here.

VENEREAL DISEASES.—1, Gonorrhœa (*see separate notice*); 2, soft sore (false syphilis); 3, syphilis proper.

SOFT SORE, soft chancre, simple chancre, chancroid. *Causes.*—Inoculation from another soft chancre. According to Hutchinson's views, it is non-specific in origin, and arises merely from inoculation with pus, the result of ordinary suppuration at a certain stage. Contracted not only through impure sexual intercourse, but occasionally also by accoucheurs, midwives, etc., accidentally. Bassereau, “by the aid of repeated confrontation of the patients infected with those who had given them the disease, succeeded in proving that” soft chancre “resulted from a chancre of the same kind.” *Relative Frequency* (as compared with hard chancre).—Four to one (8,045 to 1,955). *Objective Characters* (period of incubation, nil).—Successively, redness, slight swelling, vesicular pustule, ecchymatoid pustule, ulcer. Ulcer is rounded, clean-punched, spreading, rather deep, with a floor, uneven, dirty-looking, purulent, and with abundant highly contagious secretion. Any hardness of base is rare; but such as there is, is that of ordinary inflammatory thickening. *Course* is progressive, *tendency* destructive for three or four weeks; then natural termination is in cicatri-

zation, with depressed white soft scar. *Complications.*—1, Inflammation; 2, gangrene; 3, phagedæna; 4, phimosis. In consequence of the liability to these, a classification has been made of soft chancres into 1, simple; 2, phagedænic; 3, gangrenous or sloughing. The phagedænic is characterized by unusually rapid, obstinate, destructive ulceration. Its form is irregular, edges livid, surrounded by copper-colored areola; secretion thin, very offensive. Occurs in broken-down subjects. Gangrenous chancre is usually a consequence of phimosis with inflammation. The prepuce is the part which usually sloughs. Great hemorrhage may occur. *Usual Positions of Chancre in Women.*—Just inside fourchette or labia minora. Sometimes on cervix or os uteri. *Diagnosis.*—From herpes, by the latter being, at most, an excoriation. From Hunterian chancre, by absence of characteristic induration, by state of inguinal glands, by more active character of ulceration, and by ulcers appearing immediately after exposure to contagion. *Prognosis.*—Soft chancre has been said to occasionally lead to constitutional syphilis. The advocates of dualism (*i.e.*, the great mass of modern authority) deny it. Bubo (suppurating) attends or follows soft chancre occasionally, especially if chancre affect frænulum, or be irritated. *Treatment.*—1. Of simple chancre: Restrict walking exercise. Low or moderate diet, cleanliness, wash with hot water twice daily, each time dressing with lint and lotio nigra (calomel, 3 j.; aquæ calcis, ʒ iv.), or blue wash (cupri sulph., gr. j.; aqua, ʒ j.), or with iodoform (contraindicated if the sore be inflamed). If seen in first week cauterize with any caustic (argent. nit., acid. nit., acid. carbol. fort., etc.). In later stage, when indolent, stimulation with ung. hyd. oxid. rubri, or a touch of argent. nit. may do good. For painful erection at night, use morphia suppositories. When phimosis is present, try frequent hot injections beneath prepuce, rest, and elevation. Avoid operation if possible. 2. Phagedænic chancre requires generous diet, regulation of digestive and other systems, opium internally, and local caustic and antiseptic applications (carbolic oil, i.-x. Acid. nitric. dil., 3 j.; aquæ, ʒ iv.). Some sores can only bear non-irritant lotions, such as lead and opium. Change of air often seems to act wonderfully.

Bubo.—See separate notice in alphabetical order. In addition to the notes given there, it may be stated that the bubo consequent on a soft chancre is itself a chancre of the gland affected. Matter from the interior of this suppurating gland will, when inoculated, excite a true soft chancre.

SYPHILIS (true syphilis) is either *acquired* or *hereditary*.

Acquired Syphilis.—Ordinary true syphilis. *Causes.*—Always contagion; almost always direct contagion, *e.g.*, impure sexual intercourse, kissing, nursing (*i.e.*, suckling), unnatural offences, and sometimes, unfortunately, the performance of obstetric duties. The blood and other constituent fluids of a syphilitic patient are capable of syphilizing by inoculation. But excretions of such a patient are innocuous. It is even stated,

but not proved, that vaccine lymph can only transmit syphilitic poison when mixed with blood.

Pathology and Semeiology.—In the progress of syphilis there are four periods, viz.: 1, Incubation; 2, local eruption or primary lesion; 3, general eruption, or secondary syphilis; 4, gummy products, or tertiary syphilis. “Well-marked differences separate each of these periods; in the first it is the complete absence of local manifestations; in the second, the presence of a single unique modification of the tissues at the point of deposition of the contagious matter. Numerous but superficial lesions, which generally leave no appreciable trace of their passage, characterize the third (*i.e.*, secondary) period; while the fourth is distinguished by changes more deep-seated, and usually followed by cicatrices. Moreover, inoculable and hereditary in the second and third periods, syphilis does not appear to be contagious either in the first or in the last” (Lancereaux).

Period of Incubation.—Three to five weeks.¹

Local Eruption (Primary Syphilis); Hunterian or Hard Chancre; Infecting Chancre.—Microscopically examined, every hard chancre evidently owes its hardness to cellular infiltration and consecutive formation of new fibrous tissue, and the ulceration is partly due to “granulo-fatty metamorphosis” of the infiltration and the infiltrated tissue.

Three kinds of hard chancre: 1, dry papuli; 2, chancriform or chancrous erosion; 3, ordinary Hunterian chancre.

Dry Papuli.—Very rare. “A papular protuberance, usually having the form of a patch, one or more centimetres in extent, of a dark or *brownish red* color, round or oval, *firm* and elastic, and sometimes covered with whitish scales, which give it a certain analogy with the syphilitic papules of the next” (*i.e.*, secondary) “period.”

Chancrous or Chancriform Erosion; Parchment-like Chancre of Ricord.—Usually occurs just behind corona glandis. When pinched up beneath the finger, it feels like a thin, hard wafer, or piece of parchment. Two such chancres out of three leave no permanent duration behind them.

Ordinary Hunterian chancre not only has a hard base, but is surrounded by an elevated, hard, callous border, so that it is deeper in the middle than at the periphery. When the result of inoculation, its successive appearances have been observed to be as follows: red spot, red or dirty yellow papule, covering of grayish scales, scales accumulated to a crust, finally a cup-shaped ulcer. Fully developed, its surface is indolent, glossy, lardaceous, and its secretion scanty, thin, degenerate, not pus, and not reinoculable on the same subject. Usually heals after about six weeks. The

¹ In vaccino-syphilis the vaccine scar begins to show syphilitic signs, *e.g.*, inflammation and induration, about a month after inoculation, in the meantime the pustule having followed quite a normal healing course.

characteristic hardness feels like half a split pea, and does not usually entirely disappear in less than four months ; it may be permanent.

Seat of hard chancre is, in females, usually external genitals, rarely vagina, sometimes uterine neck or os, sometimes quite other regions of the body.

INDOLENT BUBO ; TRUE SYPHILITIC BUBO.—Glands affected always multiple, usually numerous. Surrounding cellular tissue not affected, each gland is consequently distinguishable. Characters,—hardness, smoothness, oval or round shape, enlargement not great. Sometimes one gland much larger than rest. Never suppurates except under circumstances of special irritation. Appears coincidently with induration of chancre, and considerably outlasts it.

SUBSEQUENT INDURATION OF OTHER LYMPHATIC GLANDS, especially in nape of neck, axilla, and groin of opposite side, very frequent. This may last for years, and is valuable to assist in diagnosing a case where history of syphilis is not easy to get.

SECONDARY SYPHILIS ; PERIOD OF GENERAL ERUPTION.—Often ushered in by feverishness, gastric disturbance, dizziness, pains in joints, lassitude. These symptoms have before now led to a false diagnosis of intermittent fever, typhoid, neuralgia, or rheumatism. The parts chiefly affected by secondary syphilis are—1, skin ; 2, mucous membrane ; 3, glands ; 4, iris and neighboring parts of eye.

Skin Syphilides ; Syphilitic Exanthemata.—Varieties : 1, erythematous syphilide ; 2, papular syphilide ; 3, pustular syphilide ; 4, vesicular syphilide ; 5, squamous, and, 6, pigmentary syphilide. General diagnostic peculiarities of syphilides : 1, copper color ; 2, pigmentary stains left behind ; 3, indistinctness of type (*e.g.*, in the same subject are seen transitional forms between roseola and psoriasis, and few or no patches which are distinctly either one or the other) ; 4, situation (*e.g.*, syphilitic psoriasis is not confined to the knees and elbows, as is so often the case with simple psoriasis) ; 5, shape of groups of eruption, usually circular or crescentic ; 6, absence of itching ; 7, unusual thickness of crusts and scabs.

Erythematous Syphilide ; Syphilitic Roseola.—Rose-colored spots, or red and slightly raised patches. Generally commences on trunk. Course slow. In diagnosing from non-syphilitic erythemas consider the history of the patient and the state of the glands. *Prognosis.*—Usually disappears under a month's mercurial treatment. Said to augur rather a mild attack of syphilis.

Papular Syphilide.—Coppery-red papules, chiefly on trunk, but also on limbs, forehead, and hairy scalp. Leaves no permanent scar.

Pustular Syphilide ; Syphilitic Impetigo.—Appears at a later stage than the preceding syphilides, but not so late as syphilitic rupia, which indeed is a tertiary affection. The pustules suppurate, scab, and leave scars. It

lasts for several months, and might at first be mistaken for small-pox, and, later on, for common acne.

Vesicular Syphilide.—Extremely rare.

Squamous Syphilides ; *Syphilitic Psoriasis*.—Spots rarely large, color coppery, scales thin. Fissures. Frequently palmar and plantar in situation. Palmar psoriasis characterized by "slightly prominent, rounded spots, of a coppery color, covered with hard grayish confluent scales, which in some cases take the form of cracked patches, and give rise to chaps and fissures, which are often painful." Characteristic brown border at edges of patches.

Pigmentary Syphilide.—Grayish or coffee-with-milk colored patches, size of sixpence, chiefly on neck, face, and abdomen.

Alopecia.—"Primary" or "consecutive." By "primary" is meant the alopecia which occurs independently of any visible anatomical lesion during the secondary period of syphilis. "Consecutive" is the alopecia which attends various local tertiary syphilitic affections. Very common indeed, especially in women. Not confined to crown of head like senile alopecia. Affects scalp irregularly. When of long duration, indicates a severe syphilis.

Nails ; *Onychia*.—Usually moist and ulcerative ; sometimes dry, and coexistent with psoriasis elsewhere. Affects toes more than fingers. Part primarily affected is, of course, the matrix. Pain of ulcerative form often considerable. *Psoriasis of the nail* makes it horny, thickened, and fissured.

Mucous Membranes.—Especially of mouth, throat, nose, larynx, and rectum. Secondary affections of these are either (1) erythemas, (2) superficial ulcerations, or (3) condylomata. Type, *syphilitic sore-throat* (secondary). Red patches, more or less irregular, on pharynx, soft palate, and often at same time on mucous membrane of cheeks. These may be attended or followed by small superficial ulcers, surrounded by a dark red margin, covered with yellowish material, and tender, readily smarting. Must not be confounded with mercurial stomatitis and angina. The latter produce swelled gums and the odor of salivation. The throat, in the male sex, is the commonest seat of condylomata.

Condylomata ; *Mucous Tubercles*.—Chief seats : Vulva, pharynx, palate, mouth, anus, buttocks, glans penis, prepuce, scrotum, and intervals between toes. Structure : sarcomatous, or soft connective tissue. *Prognosis*.—They indicate a very mild form of syphilis.

Secondary Visceral Affections.—Of liver, nervous system, etc. (See medical works.) Secondary affections of the *joints* occur rarely, and may be diagnosed by the history. Secondary thickenings of the *muscles* and of the *periosteum* are very uncommon.

Iritis, when syphilitic, may be distinguished from rheumatic iritis by a consideration of the following table (from Lancereaux, after Desmarres) :

SYPHILITIC IRITIS.

No acute symptoms.
 Slow development of the disease.
 Yellowish green discoloration of the iris,
 dimness of the cornea and aqueous
 humor.
 Perikeratic circle little distinct.
 Synechiæ and pupillary exudations.
 Punctated keratitis in the last period.
 Condylomata of iris.
 Very little photophobia.
 No watering of eyes.
 General dulness of eyes.

RHEUMATIC IRITIS.

Always acute symptoms.
 Rapid development.
 Neither discoloration nor dimness.
 Circle very distinct
 Rarely synechiæ.
 Never punctated keratitis.
 Never condylomata.
 Photophobia intense.
 Watering of eyes abundant.
 Unusual brightness of eyes.

Course and prognosis of syphilitic iritis depend greatly upon whether the affection develops early or late during the secondary period. In the latter case, adhesions usually form between iris and capsule of lens, which keep up an irritation apt to lead to choroiditis, retinitis, and permanent impairment of vision.

PERIOD OF GUMMY PRODUCTS ; TERTIARY SYPHILIS.—In the preceding paragraphs, “we saw the morbid localizations of syphilis limited chiefly to the skin, to some of the mucous membranes, and to a small number of the organs,” *e.g.*, the eye ; “from this time syphilis extends its manifestations beyond these limits, and we find it everywhere where a web of connective tissue exists, that is to say, in all parts of the body.” “It is no longer simple hyperæmias with or without exudation, inflammations slight and of short duration, but profound changes, essentially slow in their evolution, and marked by chronic inflammations. Sometimes extensive and disseminated in a single organ, they are rather comparable to the chronic phlegmasiæ ; sometimes more limited and circumscribed, these changes appear in the form of nodules or tubercles, and it is then that the name of Gummy Tumors is more particularly reserved for them.” These two anatomico-pathological varieties, differing only in form, have the same starting-point and the same structure. Tertiary syphilis is usually separated by a distinct interval of time (sometimes many years) from secondary syphilis. And its own manifestations, in some cases, show a tendency to appear in a certain order, *viz.*: firstly, deep-seated lesions of the skin ; secondly, affection of the subcutaneous cellular tissue, muscles, and bones ; thirdly, disease of the viscera. The peculiarities of tertiary syphilis of the special organs and parts are described under the corresponding headings, *e.g.*, BONE, TONGUE, LARYNX, RECTUM, TESTICLE, ULCERS, etc. It may be stated here that tertiary syphilis attacks the skin as *rupia* and *ecthyma* ; and that the great cachexia often observed at this stage is sometimes due to diseases of the abdominal absorbent glands. *Structure of a Gumma.*—Primarily, granulation-tissue, with a delicate stroma of fibres and a few blood-vessels. Afterward, partly degenerates into a granular detritus. Its naked-eye

appearance has been well compared to boiled cod-fish, but it sometimes really resembles a solution of gum.

Prognosis.—Certainly is affected for evil by bad nourishment, want of cleanliness, changeable climate, damp, darkness, very early age, and originally feeble constitution. Some cases are manifestly bad, others as plainly benignant from the first. Indications may be drawn from the character of the prime lesion. Very indurated and, still more, phagedenic chancres are of evil omen. "The first syphilide," according to Diday, "is the most valuable sign to rely upon." With a trivial roseola, not showing any tendency to become papular, spontaneous cure is almost certain. Papular, squamous, pustular, and vesicular syphilides indicate probability of a worse attack of syphilis. "Syphilis once, syphilis ever," is the teaching of an influential body of pathologists who have yet to prove their thesis. Numberless instances have been observed of syphilitic patients who during the remainder of a long lifetime have enjoyed sound health, and begot families of vigorous, apparently untainted children.

Treatment.—Public prophylaxis. Registration and periodical inspection of prostitutes. In some Continental towns, males who visit immoral houses are also inspected. Private hygiene: none thoroughly effective except morality. Cleanliness, etc. Carbolic soap. Oil of eucalyptus. History of treatment of syphilis may be divided into three main periods: the first, when mercury was almost all in all, being rivalled only by guaicum, sarsaparilla, and other vegetable diaphoretics; the second period, when the still powerful school of anti-mercurialists had its origin in the experience of the British army surgeons during the Peninsular War; and the third and present period, in which nine surgeons out of ten give mercury with discretion, both as to amount and time, and frequently substitute for it iodide of potassium. Practically convenient to notice treatment of primary, secondary, and tertiary syphilis independently.

Primary Syphilis.—Sigmund's statistics tend to prove that cauterization of the spot inoculated is very successful in averting, if only it be effected early in the period of *incubation* (before any chancre has appeared).¹ Mercury unable to prevent secondaries, but useful to hasten the absorption of a very indurated chancre, which is slow to disappear. Locally, cleanliness and *lotio nigra*, or calomel ointment one part + simple ointment four parts, applied three times a day. For treatment of phagedæna, see SOFT CHANCRE.

Treatment of Secondary Syphilis.—General and local.—General: Mercury in small doses, *e.g.*, hydrarg. c. creta, gr. iij., bis die; calomel, gr. ij., with opii, gr. ss., ter die; hydrargyri iodidi virid., gr. ij., ter die; pil. hydrargyri, gr. v., opii, gr. ss., bis die; liq. hydrarg. perchlor., 3 j., ter die. Mer-

¹ Sir James Paget and Mr. Hutchinson are in favor of trial of cauterization in early stage of hard chancre.

curia linunction, ung. hydrargyri, 3 ss.—3 j. rubbed into skin of inner side of thighs, arms, and of belly alternately, every evening; calomel ointment, which is cleaner, may be substituted. The peroxide of mercury dissolved in olive oil is another “elegant” preparation for external use. Fumigation.—Apparatus required: spirit lamp, common tin plate, small tin for boiling water, tripod to support tin plate over spirit lamp, cane- or wood-bottomed chair, and blanket. Calomel, gr. xx., to be placed on plate dry. Tin of boiling water to be put on plate beside the calomel; lamp lighted; patient sits on chair with blanket round him. Lamp to be blown out in ten minutes, but patient sits a quarter of an hour longer, and then gets into bed without drying his skin. Repeat every night or every other night. Iodide of potassium often given in secondary syphilis. Dose v.—xv. grains, best combined with some alkali. Iodide of potassium and liq. hydrarg. perchlor. sometimes prescribed in same mixture, especially in scrofulous subjects. Red or periodide of mercury results. Mercury usually given cautiously till the gums become slightly touched, and then stopped. When giving pot. iod. the signs of iodism should be watched for—to guard against them, not to produce them. They are catarrh of the mucous membrane of the nose, frontal sinuses, eyes, etc., great nervous depression, and sometimes a rash. Locally, many secondary affections require no treatment, *e.g.*, roseola and most squamous syphilides. For sore throat, gargarisma nigra; for mucous tubercles, calomel + zinci oxidi $\bar{a}\bar{a}$ $\bar{a}\bar{e}\bar{q}\bar{u}\bar{a}\bar{l}\bar{e}\bar{s}$ partes, occasionally argent. nit; for ulcers, ung. hydrarg. oxid. rubri, or calomel ointment, or lotio nigra, or purely non-specific treatment. For intra-anal and rectal affections, cleanliness and mercurial suppositories.

VACCINO-SYPHILIS and HEREDITARY SYPHILIS.—*See* Appendix.

Talipes.—*See* CLUB-FOOT.

Tarsus, Disease of, usually begins in the bones.—*Diagnosis.*—From disease of the ankle-joint by the swelling being below the malleoli in affection of the astragalo-calcaneal joint, and by the motion of the ankle-joint being comparatively free; of course disease of anterior part of tarsus is easy to distinguish from ankle-joint disease. Diagnosis of exact tarsal joints and bones affected very important from its bearing on treatment. When the swelling, tenderness, etc., are on the outer side of the foot, whether affecting os calcis or cuboid, or both, if disease be inveterate, excision is decidedly indicated. But when disease affects scaphoido-cuneiform joints, and centre of tarsus, the necessity of amputation is to be feared. Excise for disease of astragalus, or astragalo-calcaneal joint. Disease of os calcis usually confined to bone, not reaching any joint for some time. It should be gouged out. Exact diagnosis is easiest when there are sinuses through which dead bone can be felt. Sulphuric acid, slightly dilute (1 in 3), well adapted for dissolving dead bone in some of these cases. In early stages, rest, pressure, etc., combined with out-door exer-

cise, indicated. A high heel should be placed on the sound foot, a plaster-of-Paris bandage on the diseased one, and the patient sent about on crutches. (*Vide* BONE, SCROFULA, etc.)

Tendons, Ruptured, should be treated like ruptured muscles. Rest in relaxed position for a fortnight. Afterward careful and gradual motion for weeks before attempting free use.

TENDONS, CUT, can often be advantageously united by suture.

TENDONS, SYPHILITIC GUMMATA OF, occur.

Testicle.—Abscess ; Absence ; Atrophy ; Cancer ; Cystic Disease ; Development Imperfect ; Enchondroma ; Fibrous and Fibro-cystic Tumor ; Hernia Testis ; Inflammation (Orchitis and Epididymitis) ; Injuries ; Malposition—Inversion, Testicle in Perinæum, Testicle in Groin below Poupart's Ligament, Retained Testicle in Abdomen, in Inguinal Canal ; Neuralgia ; Scrofulous Testicle ; Syphilitic Testicle.

TESTICLE, ABSCESS OF.—*Causes*.—Generally chronic or subacute orchitis of syphilitic or scrofulous origin. *Occasional Results*.—Hernia testis, troublesome sinuses, and recurrent inflammations. *Treatment*.—Apply general principles. Do not open too early.

TESTICLE, ABSENCE OF.—An extremely rare condition, except in cases of general abnormality of the genital organs. Curling quotes trustworthy case from the practice of Page, of Carlisle.

TESTICLE, ATROPHY OF.—*Causes*.—1, the contraction of lymph effused in the course of any variety of orchitis ; 2, similar contraction the result of hæmatocele, and even of hydrocele ; 3, excesses, sexual or alcoholic ; 4, varicocele ; 5, operations for varicocele, especially those in which the spermatic artery is injured ; 6, elephantiasis scroti ; 7, injuries of the head ; 8, injuries of the spine ; 9, blows on the back of the neck ; 10, old age. *Treatment*.—Remove the cause if possible ; use means to excite the arterial circulation in the part, and to support the veins. Attend to general health. In some cases rest, in others exercise of the genital organs will be indicated. *Prognosis* depends on cause and persistence. In genuine cases, bad.

TESTICLE, CANCER OF.—Almost always encephaloid. *Pathology*.—Begins usually in the body of the testis. At first the tubular structure of the testicle is spread around the cancerous mass, not mixed with it. Cancerous mass is soft and pulpy, generally whitish in color ; cystic, cartilaginous and fibrous masses occasionally interspersed. Growth usually rapid. Very little tendency to ulcerate through skin. Great tendency to infection of lumbar glands. Secondary formations occur in lungs and elsewhere. Inguinal glands sometimes affected. *Signs*.—A solid enlargement of the testicle, progressing rapidly, without inflammation, is almost always cancer. Testicle smooth and firm, till localized softening occurs. Pain, dull. Special testicular sensation no longer evolved by pressure. Cord not affected early. General health perfectly good at first. *Diagnosis*.—The first

thing is to make sure that the enlargement is solid. A trocar will settle this in doubtful cases. (*Vide HYDROCELE.*) Next, a diagnosis has to be made from orchitis, syphilitic, scrofulous, or simple. History, concomitant symptoms, and the effect of mercury, pot. iod., oleum morrhuae, etc., help to decide this. "The diagnosis from cystic disease may be based partly upon the rate of growth, but especially upon the information elicited by the trocar." (Humphry.) *Prognosis.*—Usually fatal in one and a half to two years. Many cases of removal without recurrence have been recorded. *Treatment.*—Unless the disease has spread to the abdomen, remove the testicle.

TESTICLE, CYSTIC DISEASE OF.—*Pathology.*—A tumor, consisting of multitudinous cysts of any size up to that of a walnut, with thin walls, lined by tessellated epithelium, and containing fluid varying in consistence from that of serum to an almost gelatinous thickness. At least three views as to the origin of the cysts, viz.: (1) dilatation of tubuli seminiferi, (2) dilatation of tubules of rete testis, (3) a fibrous or fibro-cartilaginous tumor in the testicle, with more or less of cyst-formation in the tumor. The cysts are sometimes "proliferating," containing fibrous or cartilaginous masses. *Symptoms and Diagnosis.*—Negative symptoms, such as absence of pain, of thickening of the cord, of inflammation, and of constitutional disease, together with positive symptoms, such as smoothness, oval or spherical form, and slow growth, generally reduce the final diagnosis to a distinction from hydrocele or hæmatocele. Cystic disease is heavier than hydrocele, fluctuates less, and is non-transparent. Moreover the testicular sensation usually remains and is diffuse owing to the granular substance being present on every side of the tumor. In hydrocele and hæmatocele, this sensation is, of course, confined to the seat of the testicle. A good sized trocar is usually employed to settle the question. *Treatment.*—Castration. But if a patient has only one testicle, a less radical operation may be considered.

NOTE.—Cystic disease is sometimes associated not only with enchondroma, but with recurrent sarcoma and with soft carcinoma.

TESTICLE, IMPERFECT DEVELOPMENT OF, may occur, affecting either the body of the gland or the epididymis, or both. So also part of or even all the vas deferens may be absent, the testicle being present and even full-sized. Such cases may be virile, though necessarily sterile. Another form of imperfect development will be noticed under heading Malposition.

TESTICLE, ENCHONDROMA OF.—Usually associated with cystic disease, sometimes with soft cancer, the small masses of cartilage growing into the cysts. ? as to whether growths commence in lymphatics or in tubuli of the gland. Appearances, naked-eye and microscopic, much like those of hyaline cartilage.¹ *Diagnosis.*—Characteristic weight and hardness. *Treatment.*—Excision.

¹ Mr. Savory once observed of a section of a lovely specimen, "like pearls, only more precious."

TESTICLE, FIBROUS AND FIBRO-CELLULAR TUMORS OF.—Very rare. Refer, if necessary, to Curling or Humphry.

HERNIA TESTIS.—The condition in which, as a result usually of abscess, but sometimes of wound, the whole or a part of the tubular part of the gland escapes through an aperture in the tunica albuginea, and through a corresponding opening in the scrotum. Any form of chronic orchitis may lead to hernia testis. The projection looks like a mass of granulations. Both the tubuli and the margins of the opening through which they protrude are thickened by fibrous deposits. *Treatment*.—Cleanliness, rest, unguent. hydrargyri oxidi rubri or ung. hydrarg. nitrat. locally, or strapping, combined with appropriate general treatment, usually cause the skin to cicatrize over. In more obstinate cases, try incision of constricting edge of tunica albuginea (Pagan, of Glasgow), or, after slitting up all sinuses, the edge of the skin wound may be freshened and brought together over the protrusion (Syme). Anything like paring off protrusion rarely necessary and usually mischievous.

TESTICLE, INFLAMMATION OF (Orchitis and Epididymitis).—*Varieties*.—1, Acute; 2, Chronic. A list of sub-varieties might be made out, founded on the etiology, e.g., gonorrhœal, traumatic, syphilitic, scrofulous, metastatic, etc. (*Vide* STRUMOUS TESTICLE and SYPHILITIC TESTICLE.)

Acute Orchitis (Inflammation of the body of the testicle).—*Causes*.—Blows, wounds, metastasis (mumps), and rheumatism. *Symptoms*.—Ordinary signs of inflammation, viz., pain, tenderness, heat, redness, swelling. Effusion into tunica vaginalis. When accompanying mumps, it begins about fifth or sixth day. *Treatment*.—Rest, suspensory bandage, cold lotions, aperients, antimony (antim. potass. tart., gr. j., aquæ fervent., $\frac{5}{8}$ viii.; $\frac{5}{8}$ j. 4^{ths} hortis). Leeches: they should be placed over the cord (Humphry). Puncture of tunica vaginalis, or even of testicle, with a sharp, narrow-bladed knife.

Acute Epididymitis.—Frequently, though not quite accurately, termed “acute orchitis.” *Causes*.—Mostly gonorrhœa. Any urethral irritation, e.g., stricture, catheterization, lithotomy, impacted calculus. Blows. Rheumatism, gout. Epididymitis may supervene during any stage of a gonorrhœa. *Symptoms*.—Tenderness, pain, swelling, and hardness of epididymis. Effusion into tunica vaginalis. Skin reddened and tender. Constitutional disturbance, fever, sickness. Resolution usually commences within a fortnight, but thickening may persist for months. *Treatment*. (*See* ACUTE ORCHITIS).—Worth while to persist with treatment in or to remove the residual thickening, as the latter, if left, may interfere with function of testicle. Suspensory bandage, moderation in all things, and, experimentally, pot. iod. internally.

Chronic Orchitis.—*Causes*.—(1) acute orchitis; (2) syphilis; (3) struma; (4) injuries. Acute inflammation in the testicle, as elsewhere, sometimes subsides into chronic. Most cases of chronic orchitis are syphilitic and

very indolent. (See STRUMOUS TESTICLE and SYPHILITIC TESTICLE.) The treatment for syphilitic is adapted also for non-specific, chronic orchitis.

TESTICLE, INJURIES OF.—Blows cause intense shock. Mobility of testicle and strength of tunica vaginalis greatly protect testicle. Extravasation into cord may extend up to kidney, or even higher. Chronic, and, more rarely, acute orchitis may supervene. This orchitis may hopelessly damage organ. *Treatment*.—Apply general principles. Testicles bear incised wounds well. Recovery from self-mutilation usually rapid.

TESTICLE, INVERSION OF.—When testicle lies in front of, instead of at back of, scrotum, it is liable to be injured in tapping a hydrocele.

TESTICLE, OTHER FORMS OF MALPOSITION OF, are known as: 1, retained testicle; 2, descent of testicle into perinæum; 3, descent of testicle into groin. The testicle in the perinæum is liable to injury, especially during riding. Operations to restore it to the scrotum have been performed by Adams and by Annandale. An undescended testicle may remain above the internal abdominal ring, or may enter the inguinal canal. Size and maturity of gland then sometimes imperfect; but impotence not necessary, and perhaps not usual, even when both glands are retained. Liability to certain accidents, *e.g.*, (1) inflammation, which may be confounded with strangulated hernia or with bubo; (2) attacks of severe pain owing to testicles being suddenly “trapped” between abdominal facie; (3) encysted hydrocele; (4) complication with congenital hernia frequent. Excessively troublesome testicles in inguinal canal have been excised. *Treatment*.—When a hernia adherent to testicle threatens to descend with it, both had better be kept in abdomen by a truss. When a non-adherent congenital hernia exists, apply a truss above testicle and below hernia; or, if testicle is still in abdomen, dispense with truss for a while in the hope that it may descend. Be in no hurry to operate upon a hydrocele of the testicle in the inguinal canal. Remember that tunica vaginalis cavity usually in these cases communicates with that of peritoneum.

TESTICLE, NEURALGIA OF (with which may be associated “irritability,” or “hyperæsthesia,” or tenderness of the testicle; although this condition may exist separately). *Causes and Pathology*.—(1) reflex; (2) the obscure state of the nerves and vessels of a part commonly associated with neuralgia elsewhere, and manifested chiefly by signs of congestion; (3) in some rare cases, the presence of coarse organic disease, *e.g.*, chronic abscess (*vide* specimen in Hunterian Museum); (4) malaria. Reflex neuralgia results from stone in the bladder or kidney, from varicocele, indigestion, etc. The age most subject is the period of puberty and the next ten years. The exciting cause, frequently, undue excitement of the genital organs. *Prognosis*.—Time almost invariably works a spontaneous cure, both of the individual attack and of the disposition to it. Remove the cause. Treat

varicocele, indigestion, etc. Suspensory bandage,¹ cold bath, moderation in diet and in exercise of gland, etc. Quinine for intermittent cases. Hypodermic injection of morphia (quarter grain). Horizontal position, or elevation of pelvis and lower extremities.

STRUMOUS TESTICLE.—*Causes.* (*Vide SCROFULA.*) *Pathology.*—A deposit of tuberculous matter takes place within the convoluted tubes of the epididymis. This matter is probably at first mainly a collection of epithelial cells. Subsequent change into a cheesy or into a calcareous mass. In the meantime chronic inflammation tends to destroy the walls of the tubes, and to connect the tubercle into one mass. Color of tubercle, white or yellowish white.* Disease usually begins in epididymis, but when it commences in the body of the gland, small, scattered gray tubercles first appear. These enlarge, and coalesce in parts of the gland. The ordinary processes of chronic inflammation occur around the deposits. These usually result in formation of abscesses and sinuses. Vas deferens usually thickened. Both testicles often affected. Coincident disease of lungs frequent, and of kidney, prostate, vesiculæ seminales, etc., occasional. *Signs.*—Epididymis and sometimes body of gland enlarge slowly; very little pain, except when an abscess is ripening. Formation of abscesses. Thickening of vas deferens. Scrofulous appearance of patient. Sometimes coincident disease of lungs, etc. Any ordinary affection of testicle may be the commencement of strumous disease in a strumous person. *Prognosis.*—With suitable treatment, many cases make a satisfactory recovery, the tubercle degenerating and becoming encapsuled, or discharged. *Treatment.* (*Vide SCROFULA.*)—Suspensory bandage, cold sponging in indolent cases, iodine externally. Lay open and clean obstinate sinuses. Only in thoroughly hopeless cases, such as resist treatment and obviously undermine the health, is excision justifiable. (*Vide HERNIA TESTIS.*)

TESTICLE, SYPHILITIC.—A tertiary manifestation. *Pathology.*—(Compare with STRUMOUS TESTICLE. See above.) Generally confined to body of gland, epididymis and cord remaining healthy. Deposit of lymph in areolar tissue between the tubules, sometimes in nodules. Different lobules affected in different degrees usually. Lymph-nodules upon tunica albuginea. Disease sometimes spreads to tubuli. Tendency to fibrous degeneration, eventual contraction, and even atrophy of the affected gland. Both testicles often attacked, usually one after the other. Liability to abscess and hernia testis. *Symptoms.*—Enlargement, usually slow. Amount of pain depends directly on rapidity of progress. Frequently neither pain nor tenderness. Stony hardness. Knotty feel (not always). Epididymis not usually distinguishable from rest of gland. Hydrocele often coexists. History of syphilis: perhaps other collateral symptoms, e.g., nodes. *Diagnosis.*—Compare symptoms, as given above, of strumous

¹ See Varicocele.

testicle. Chronic orchitis caused by injury, or by stricture, can scarcely be distinguished from syphilitic, except by the history and general symptoms. But it requires similar treatment. *Prognosis*.—Danger of atrophy. Liability to relapse. Quite under control of antisyphilitic remedies. *Treatment*.—Support by strapping may be employed, unless suppuration be progressing. Suspensory bandage. Iodine or mercurial ointment locally when pressure is not advisable. Open abscesses early. Give iodide of potassium internally, or order mercurial inunctions. (See SYPHILIS.)

Tetanus.—*Causes*.—1, wound; 2, catching cold; 3, race; 4, male sex. Wounds in which nerves are lacerated or left in contact with sharp spiculæ of bones or with foreign bodies, and wounds of the hand or foot, are said to be especially liable. Tetanus is a more common complication of compound fractures than of surgical operations. Exposure to cold or sudden change of temperature rarely acts without a pre-existing wound. Negro race is very subject. *Pathology*.—Richardson, Billroth, and others teach that it is a zymotic disease, *i.e.*, a poisoning of the blood through the absorption of septic material, which septic material is formed by decomposition in the wound. Brown-Séquard and many others regard tetanus as an affection of the spinal cord which has spread from some irritated sensory nerve or nerves in the wound, when there is one. In favor of the latter theory may be cited cases in which the spasm has been confined to the injured side of the body, or even to the injured limb itself. Often no post-mortem appearances have been seen in the cord; sometimes softening of the central gray matter. It has been truly observed that great changes ought not to be expected, because “it would be quite impossible for motor impulses to originate from a spinal marrow reduced to a mass of débris.” Coats (*see* “*Med. Chi. Trans.*,” vol. lxi.) observed changes in medulla oblongata like those in cord, and even a morbid condition of the motor regions of the convolutions. There was an accumulation of leucocytes round the vessels of the medulla, of the cord, and of the kidneys, which in his opinion supported the theory of a poison circulating in the blood. *Symptoms and Course*.—Typical case: A man with compound fracture of forearm, about three or four days after the accident complains of pain in the part, and is rather feverish. The next morning his neck is stiff and his jaw also: he thinks he has caught rheumatism in that region. Within twenty-four hours short spasms of the back occur when the patient is momentarily exposed or fed, or otherwise excited. The spasms rapidly affect also the abdomen and the extremities; and now, instead of being merely transitory, as at first, they never wholly pass away, the abdomen feels hard like a board, the back is arched (*opisthotonos*), the hands are clenched, the face marked by the *risus sardonius*, and the jaw much more fixed than before. Skin bathed in perspiration. Temperature raised to about 100°. Bowels constipated. Respiration impeded by stiffness of respiratory muscles (chest feels “as if in a vice”), intellect quite clear, no

sleep ; pain in the muscles, becoming intense when the spasms are aggravated. Slight noises, draughts, and other trifling irritants cause the tetanic spasms to be suddenly trebled in force. During one such paroxysm, patient dies asphyxiated. Or he lingers on for a few days or a week, and perishes of gradual asphyxia (carbonic-acid poisoning) or of exhaustion. Such is the course of acute tetanus, and traumatic tetanus is usually acute. But the disease is sometimes chronic, especially if it be idiopathic. Then all the symptoms are less severe, the patient is able to take a fair amount of nourishment, and gets some sleep. His breathing is not seriously interfered with, and he has considerable chance of recovery. There are intermediate grades of severity of every shade. Expression of face called risus sardonicus arises from contemporary spasm of all the muscles of the face ; dilators, compressors, levators, depressors, altogether. Thus every line is deepened and every feature fixed by its muscles, just as a ship's mast is by its stays. This expression may persist long after otherwise perfect recovery. Sometimes the trunk is arched forward (emprosthotonos) or sideways (pleurosthotonos).

TETANUS NEONATORUM is attributed to the wound caused by dividing the umbilical cord. It is first observed by the mother or nurse, in consequence of the lock-jaw preventing entrance of finger or nipple into mouth. Course presents nothing peculiar. Almost always fatal.

Diagnosis of tetanus from (1) strychnia-poisoning, (2) hydrophobia, (3) hysteria, (4) rheumatism.—Strychnia-poisoning is much more rapid, both in its onset and in its advance to a fatal result. The paroxysms of spasm are interrupted by periods of complete relaxation. Hence there is no continuous lock-jaw. Death almost always takes place within two hours, at latest. In tetanus, the most rapid death on record was after four hours' duration. Hydrophobia. See following table (abbreviated and slightly modified from Poland) :

TETANUS.

1. Spasms continued (tonic).
2. Cause—wound, or exposure to cold.
3. Appears generally soon after injury.
4. Risus sardonicus.
6. Frequently gastric pain, but no vomiting.

HYDROPHOBIA.

1. Intervals of complete relaxation (spasms clonic).
2. Bite of a rabid animal.
3. Period of incubation usually a month or more.
4. Countenance expressive of excitement, fearful distress and peculiar restlessness ; occasionally frightfully convulsed ; eyes bright and glistening, but at times suffused.
5. Thirst ; often aversion to fluids ; discharge of viscid saliva.
6. Vomiting and gastric pains.
7. Mind becomes delirious.
8. No authentic case of recovery.
9. Intolerant sensibility of surface and organs of sense.

Prognosis.—Acute traumatic tetanus almost always fatal. Subacute traumatic tetanus often recovers, especially if it does not appear till some time after the wound, and progresses slowly. The prognosis is favorable according to the duration of the disease. Thus, a tetanus which has endured three weeks is extremely likely to recover. Idiopathic and chronic tetanus have a favorable prognosis. The longest duration of any recorded fatal case has been thirty-nine days. **Treatment.**—Remove every source of excitement, keep the room dark and silent, lay down thick carpets, protect from draughts by screens. Cover the patient with light, warm clothing, so as to encourage copious diaphoresis. Examine the wound very carefully, if one exists. Remove any foreign body or splinter. If a nerve is believed to be irritated, a portion of its course may be excised. Those who regard tetanus as a septic poisoning would be justified in taking measures to make the wound antiseptic. Amputation has been done. Many drugs have been tried, chiefly anodynes and antispasmodics. Most surgeons now choose between chloral, morphia subcutaneously, opium internally, and Calabar bean. Curare. Chloroform. Quinine. Ice-bags to spine. Of Calabar bean, Garrod writes: "In tetanus, enough must be given to produce the physiological symptoms of the drug. One-third gr. of the extract, rubbed up with 10–15 minims of water, and neutralized with a little carbonate of soda, may be injected every two or three hours subcutaneously, where swallowing causes pharyngeal spasm. If given by the stomach, 1 gr. of the extract rubbed up with a little weak spirit. According to Frazer, Calabar bean should be given at the very onset of the attack, for the contraction of muscles begets a substance which excites muscular contraction. When Calabar bean is given, its action should be carefully watched, lest the respiratory muscles become paralyzed by it. Rational indications, derived from the post-mortem evidences of hyperæmia, etc., of spinal cord, are to give belladonna, and to employ every available means of diminishing spinal congestion (Fitzgibbon, *Dublin Medical Journal*, March, 1877). And also, I think, if the wound be not too large, to swab it thoroughly with pure carbolic acid. The patient should be patiently and frequently fed with milk and the strongest beef-tea. Tracheotomy has been recommended when there is a tendency to laryngeal spasm.

Thorax.—See CHEST.

Thrombosis.—See VEINS.

Thumb may be bifid, or it may be double.

THUMB, DISLOCATION OF.—See DISLOCATIONS.

Thyroid.—See BRONCHOCELE.

Toes may be hypertrophied, be webbed, bifid, or supernumerary.

HAMMER-TOE.—A condition in which the last phalanx is bent perpendicularly downward. If necessary, divide subcutaneously, opposite second phalanx, the corresponding digital offset of plantar fascia. Doubtful whether its origin be a nervous contracture or the pressure of tight boots.

Tongue, Diseases of.—With a view to facilitating diagnosis (a rather difficult task to the student of tongue diseases), I shall adhere to the following analytical classification, which starts from the most palpable feature of each disease. I. Superficial ulcerations—simple; syphilitic primary, secondary. II. Deep ulcerations—1, simple; 2, syphilitic; 3, malignant. III. Localized swellings—abscess, innocent tumor (very rare), naevus, gum-mata, malignant. IV. General swelling—acute inflammation, congenital enlargement, general enlargement secondary to other diseases of tongue or of digestive tract. V. Non-ulcerative superficial affections—psoriasis, ichthyosis, papilloma.

TONGUE, SIMPLE SUPERFICIAL ULCERATIONS OF.—*Cause.*—Indigestion; irritation of sharp-edged teeth. Occasionally aphthous inflammation. *Diagnosis.*—No induration, or at least no marked degree of it. Ulcers sometimes multiple. Tongue frequently red and glazed. Corresponding sharp edge of tooth may be detected. Signs of indigestion. Pain frequently. Absence of syphilitic history and of collateral symptoms. *Treatment.*—File sharp teeth. Touch ulcer with silver nitrate. Purgatives. Sodæ bicarb., with infus. calumbæ, before meals. The more superficial the ulceration, the more likely is chlorate of potash to be highly useful.

TONGUE, SUPERFICIAL SYPHILITIC ULCERATION OF (Secondary or Tertiary).—*Diagnosis.*—Similar ulcerations on sides of mouth or fauces. Perhaps psoriasis also present. No such marked induration as is common in cancer. History and patient's aspect may be syphilitic. *Treatment.*—Antisyphilitic. Locally, gargarisma nigra, hydrarg. c. creta, inhaling calomel fumes (5 grains nightly). Internally, either pot. iod. or hydrarg. perchlor. For obstinate syphilitic ulcer of tongue, Berkeley Hill recommends a pill of iodoform, gr. $\frac{1}{2}$, ext. gentian, gr. $1\frac{1}{2}$, three times a day.

PRIMARY ULCER (CHANCRE) OF TONGUE is not unknown.

TONGUE, SIMPLE DEEP ULCERATION OF.—Very rare. *Diagnose* from cancer and syphilis chiefly by negative signs, especially absence of induration. Tends to heal, unless phagedenic. *Treatment.*—*Vide* SIMPLE SUPERFICIAL ULCERATION.

TONGUE, DEEP SYPHILITIC ULCERATIONS OF (Tertiary).—*Causes.*—Gummatous abscess or (rarely) spread of superficial ulcer. *Appearance.*—A deep ulcer or fissure, with abrupt edges, usually toward the centre of the tongue, sometimes at the edge, and often with a history of previous tumor or swelling (gumma). Speaking of gummata of the tongue, Morrant Baker says: "They are usually, but by no means always, multiple; they rarely or never lead to fixation of the tongue, or to salivation, or to very much pain; and they are very tolerant of pressure." In these respects they contrast with cancer. *Treatment.*—Antisyphilitic, especially pot. iod. (gr. x., ter die).

TONGUE, MALIGNANT ULCERATION OF (Epithelioma).—*Causes* as obscure as those of cancer elsewhere. Chronic irritation of sharp teeth doubtless an

occasional factor. Clay-pipes. Most frequent in males and in late middle age. Commences as a fissure (rarely as a wart). Syphilitic disease said to sometimes pass into epithelioma. *Diagnosis*.—Distinguish from syphilitic ulceration by (1) hardness of base and edges; (2) absence of collateral signs of syphilis; (3) position—cancer usually begins at side of tongue, deep syphilitic ulcer generally lies near septum; (4) pain is greater in cancer; (5) glands are affected earlier and more extensively, and eventually form a huge, hard mass in cancer; (6) fixation of tongue from cancerous infiltration; (7) salivation. Unfortunately, in the very cases in which diagnosis is most difficult and most important, the above signs may not be well marked. Hence the surgeon sometimes has to try antisymphilitic remedies merely because he does not know whether he has to deal with cancer or syphilis. Tenderness—intolerance of *firm* pressure distinguishes cancer, and the characteristic hardness is of the same nature as that of scirrhus mammæ, *i.e.*, not like inflammatory induration. *Prognosis*.—Without operation, hopeless. With operation, varies from some hope of non-recurrence when a small cancer and a wide margin of apparently healthy tissue is excised, to the certainty of recurrence when the conditions are reversed. *Treatment*.—If diagnosis be doubtful, try large doses of pot. iod. (grs. x.–xx., ter die). Draw bad teeth. Forbid smoking. Regulate diet. Question of removal depends upon extent of disease. If removal of whole tongue will not suffice to take away all the disease, treatment must be palliative. Removal by (1) knife, (2) *écraseur*, (3) galvanic cautery, (4) ligature, (5) Richardson's scissors. Prefer knife for comparatively limited operations; *écraseur* most popular in extensive ones. Remove disease of anterior part of tongue, and in suitable cases even more extensive disease, by operating entirely through mouth. In some instances the whole tongue could be thus removed if Sir James Paget's advice be followed—to pass scissors into the mouth and divide the muscles which attach the tongue to the jaw, before pulling forward the tongue. In such an operation the galvanic *écraseur*, very deliberately used, would be safest, for severe hemorrhage would here be embarrassing. Various plans have been devised for giving the operator more room to work in, especially (1) Nunneley's, who passes the *écraseur* chain through a wound in the mylo-hyoid space, and prevents it from slipping forward by means of hare-lip pins piercing the base of the tongue well behind the disease. (2) Sedillot's, who divides the symphysis of the jaw (in a >-shaped manner to facilitate correct apposition after the operation). Of course the lower lip is divided also. Sedillot's incisions, combined with the *écraseur*, form the plan probably most frequently used for extensive cases. An interdental splint might be useful in after-treatment of divided jaw. (See Lyons: "St. Bartholomew's Hospital Reports," 1878.) (3) Submental operation (Regnoli's). Broad arrow-shaped incision in mylo-hyoid space, through which tongue is dragged previous to removal. Protect fa-

cial arteries, and secure linguals as soon as divided. (4) T. Smith's. Incision of cheek from corner of mouth outward. (5) Whitehead, of Manchester, cuts through base of tongue from before backward slowly with scissors, looking out for the lingual arteries. (*Lancet*, 1880.) In all operations on the tongue, a stout whip-cord ligature through middle of anterior third, metal retractors, and a simple gag, are required. Also prepare for hemorrhage. Use Clover's or Mills' method of anæsthesia through a tube. (*Lancet*, vol. i., 1879.) *Prognosis*.—Quite good for small operations. Grave for larger ones. Speech returns perfectly in former; distinct, but sadly modified, in latter. *After-treatment*.—Feed through œsophageal tube and by enemata for a few days. Use simple gargles to cleanse mouth. For distressing salivation—alum and pyrethrum gargles. A particularly lengthy, complete, and clear account of operations on tongue is to be found in Erichsen.

TONGUE, ABSCESS.—Very uncommon. *Causes*.—Obstruction of mucous glands? Syphilitic gummata? Foreign body. Make an exploratory puncture to clear up diagnosis.

TONGUE, INNOCENT TUMORS OF.—Very rare. Cysts beneath the tongue are common. (*Vide* RANULA.)

TONGUE, NÆVUS OF.—Rare. *Treatment*.—Like that of nævus elsewhere. But if it cause no unpleasant effects, and do not grow, let it alone.

TONGUE, GUMMATA OF.—Seldom seen before stage of ulceration. *Vide* DEEP SYPHILITIC ULCER OF TONGUE (above).

TONGUE, MALIGNANT TUMOR OF.—*Vide* MALIGNANT ULCERATION OF TONGUE (above).

TONGUE, ACUTE INFLAMMATION OF (Acute Glossitis).—Rare. *Causes*.—Mercurial salivation, iodism, injury, unknown influences. *Symptoms*.—Swelling, often enormous. Pain. Salivation. Danger of suffocation. *Treatment*.—Treat cause. Astringent gargles. Deep, longitudinal, dorsal incisions in severe cases. As lower surface of tongue is more extensile than upper, the former tends to present upward. Bear this in mind while incising (Wormald and Holmes Coote). Support strength.

TONGUE, CONGENITAL ENLARGEMENT OF (Macroglossia).—Very rare. *Treatment*.—Remove V-shaped piece from anterior part of tongue, and bring flaps together. Use *écraseur*. Remember that children bear hemorrhage badly. Slight enlargement of tongue is a common sign of constitutional disorder. Treat the cause.

TONGUE, PSORIASIS OF.—Sometimes, but not always, syphilitic. Whitish and dry-looking patches on the tongue, with shallow fissures. Under the microscope, the epithelial layer is found slightly thickened, but the papillæ smaller than normal. The condition should be compared and contrasted with that in "chronic superficial glossitis" (Fairlie Clarke), in which, according to Butlin, the papillæ are absent, the surface almost as smooth to the microscope as to the naked eye, the epidermis thinned, but the sub-

epithelial tissue thickened and infiltrated with cells ("Medico-Chirurgical Transactions," vol. lxi.).

Tonsillitis, Acute (Quinsy).—*Causes.*—Predisposing are chronic enlargement and depressing influences, *e.g.*, dark, damp residences, defective drainage. Exciting cause, usually catching cold. *Signs.*—Pain on swallowing, at first slight, but gradually increasing in some cases till the act of deglutition inflicts a pain like the stab of a knife. Swelling both internally and externally. The swelling may become so diffuse that the jaws may be scarcely separable. When suppuration takes place, pain usually strikes into ear and becomes throbbing. Fluctuation develops. Foul tongue (owing to oral catarrh); offensive breath; fever—temperature may rise to 104° —and slight delirium for one or two nights not infrequent. *Diagnosis.*—Seldom presents difficulty, except when the mouth will not open. Then, upon looking carefully at the patient, it will be seen that the swelling, however diffuse, has its centre below and beneath the angle of the jaw, is not chiefly in front of and below the ear as in mumps, or over the jaw as in diffuse inflammation commencing near the gums and teeth. Moreover, the voice is generally characteristically guttural, and the history clear of an acute course commencing in the throat. It is to be remembered that inflammation of the tonsils may be only part of a more serious disease, *e.g.*, scarlatina or diphtheria. *Prognosis.*—Tonsillitis usually affects those accustomed to it, and who generally know how, by a little care, to check it. But it frequently goes on to suppuration; and in exceptional cases, when very diffuse, causes death by exhaustion or by suffocation. *Treatment.*—Prophylactic, the same as that for catarrhs in general. In addition, do not wear low shirts and collars, especially as regards the night-dress. Wear a light wrapper round the throat when out at night; avoid hot, smothering comforters. Early retirement to bed, with a narrow piece of flannel round neck, will often cut short a sore-throat. Gargling, sometimes good, is often more irritating than useful. Best gargles are those of capsicum, of guaiacum, and of chlorate of potash. Give mist. guaiaci. or pot. chlor. *ad libitum*, internally. When swelling is very great, especially if fluctuation can be felt, puncture tonsil. Use a bistoury wrapped in lint, except toward the point, or a gum-lancet, and direct its edge and point somewhat inward (*i.e.*, toward median plane of body and away from great vessels). If mouth cannot be opened, patient must simply rest in bed, with a high pillow, in a rather warm, thoroughly dry room, using derivatives, such as hot mustard and water to feet, inhaling the steam of hot water, with a little creosote dropped in it. Hot fomentations may be applied externally, or leeches beneath the angle of the jaw. Do not forget that leech-bites leave scars.

Tonsils, Chronic Enlargement of.—Common in scrofulous children, especially in cold, damp climates. *Pathology.*—An hypertrophy of both glandular and fibro-cellular constituents of tonsil, the result of chronic

inflammation. *Signs*.—Visible enlargement of tonsil. Peculiar throaty voice. Occasionally difficulty of breathing. Mouth usually kept open; characteristic expression of face. Deafness. Extra liability to acute and sub-acute tonsillitis. *Prognosis*.—Considerable enlargement, if coming on before puberty, will often greatly diminish as adult life is approached, but it seldom disappears spontaneously and entirely. *Treatment*.—For severe cases of long standing, excision. Other cases should be treated as pharyngitis, *quod vide*. *Excision of Tonsil* may be effected with a bistoury and vulsellum forceps. In using tonsil-guillotine, take care to apply it with the spear or hooks toward the median line and the ring next the tonsil. Pass the guillotine into the pharynx horizontally, and rotate it to the perpendicular as you place it over the tonsil. In many cases the tonsil can be pushed into the guillotine by the forefinger of the left hand placed outside the neck.

Torticollis.—See NECK (WRY-).

Trachea, Foreign Bodies in.—See LARYNX, FOREIGN BODIES IN.

Tracheotomy, Indications for.—1. Foreign bodies in trachea or bronchi or pharynx. 2. Scalds of glottis in children. 3. Very advanced and extensive disease of larynx. 4. Croup. 5. Diphtheria in children. 6. As a preliminary step in extensive operations on and about the jaws and throat. In such cases the anæsthetic is usually administered through a tube in the tracheal opening. At the same time the glottis may be shut off from the lungs by using Trendelenburg's "trachea-tampon," thus preventing any blood from passing down the trachea. *Operation*.—Two chief varieties, *viz.*, (1) high and (2) low, respectively above and below isthmus of thyroid; latter not usually either necessary or desirable. *Instruments*.—Scalpel, dissecting forceps, artery forceps, bull-dog forceps, metal retractors, blunt hook, sharp tracheotomy hook, cannulæ (Fuller's bivalve preferable at first; Baker's rubber tubes may be substituted after a few days). Lawson recommends the bivalve cannula without the inner tube. Durham's "lobster-tail" cannula less irritating than ordinary metal tube. H. A. Martin, of Boston, U. S., does not use tubes at all. (See *Dublin Medical Journal*, September, 1878.) Tape to tie cannula in place. Sponges, ligatures, gauze, feather, kettle, curtains, etc., the latter for after-treatment. Patient lies on his back; surgeon stands on right side. Pillow beneath neck, head back. Get best light possible. Determine exact median line by seeing and feeling. Feel lower border of cricoid cartilage. Incise skin from this point downward two inches. Avoiding anterior jugulars, cut in middle line carefully down to trachea. When thyroid isthmus is recognized, it may, if necessary, be hooked down or even divided. When trachea is reached, it can easily be distinctly felt. Now insert sharp hook into trachea, always keeping to median line. Slightly raise trachea with this hook. It thus becomes defined, and can be incised with confidence. Tracheal opening to be perpendicular, and of size proportional to the pa-

tient's and to that of the cannula to be used. Always keep to the median line, and take care that the parts are not displaced laterally by the retractors. In opening trachea, turn edge of knife upward. *After-treatment.*—Usual practice is to surround bed with curtains, to conduct steam of a kettle by a tube to within the curtains, and to keep the room at a temperature of about 70° Fahr. But some surgeons (*e.g.*, Lawson) are less particular about these points, preferring abundance of fresh air. Over the tracheal wound place a sponge or a fold of gauze. From time to time, when the patient coughs, assist with a feather to clear away mucus or false membrane. Twice a day, or oftener if necessary, remove inner tube and clean it. Surgeon may occasionally remove and clean outer tube with advantage. This must frequently be done if inner tube is not used. Support strength with abundant liquid food, milk, beef-tea, etc. Of course, when cannula has to be kept in any time, it does not prevent return to solid food. Insensitiveness of glottis generally supervenes, and allows part of food to trickle into larynx. *Complications.*—(1) Hemorrhage, (2) bronchitis and pneumonia, (3) erysipelas.

Trephining.—Indications for the operation are given under HEAD, INJURIES OF. The operation is occasionally done for cases of epilepsy, in which the surgeon thinks he recognizes signs of localized mischief. And it is likely enough that the labors of Ferrier, Fritz, Hitzig, Duret, and others, together with the development of antiseptic surgery, may lead to further co-operation between the physician and the surgeon in the treatment of cerebral diseases. *Operation.*—Scalpel, dissecting forceps, artery forceps, trephine, elevator, piece of quill, sponges, antiseptic dressings, spray, etc. Unless bone is already exposed by a scalp-wound, reflect soft tissues sufficiently by Y-shaped incision. Adjust trephine so that the pin shall project very slightly beyond the teeth. If there be a fracture, place the pin on a firm edge of bone. In working trephine, take care to press evenly on all sides, lest dura mater be reached on one side before other side of trephine is half through. As dura mater is approached, saw very gently, and frequently probe with the piece of quill. As soon as this detects dura mater on one side, tilt trephine toward other side. When loose enough, remove disc of bone with elevator. Dangers: (1) of wounding dura mater: to be avoided by precautions mentioned above; (2) of wounding a sinus or large arterial branch: to be avoided partly by some precautions, but chiefly by bearing in mind anatomical landmarks.

Trochanter, Injuries of. (*Vide FRACTURES OF FEMUR.*)—Prolonged weakness, and sometimes permanent atrophy, occasionally produced by falls upon the great trochanter, even without fracture.

Tubercle.—A term applied to three substances, which are sometimes, but not always, merely three forms of the same substance, *viz.*, (1) "miliary tubercles"—small, round, transparent or semi-transparent millet-seed-like nodules, the most usual seats of which are the substance of the lungs

and the surface of serous membranes; (2) "cheesy" or "crude" tubercle—dry, opaque, cheesy masses, tending either to soften into purulent, curdy, creamy fluid, or to change to (3) a cretaceous mass. Forms 2 and 3 may be results of the metamorphosis of form 1. But they may also be due merely to changes in ordinary inflammatory products. I say "ordinary," because it is believed by many that even tubercle is sometimes a product of inflammation. That the presence in the system of cheesy masses, the result of inflammation, predisposes in some way to the formation of miliary tubercle, is pretty generally allowed. (See SCROFULA for treatment, etc.)

Tumors.—*Definition.*—Word "tumor" not always used in same sense.

(1) Surgeons sometimes use it loosely, as if synonymous with "swelling of undetermined nature," as, *e.g.*, in such a speech as this, "Examine this tumor and tell me whether you think it is an aneurism or a new growth."
 (2) The usual meaning of "tumor" is an abnormal swelling in the tissues, which cannot be clearly regarded as mere inflammatory new formation, or as aneurismal dilatation of a single vessel. The margins of this definition are necessarily uncertain, because the limits of the process of inflammation are not quite known. *Causes.*—There can be no question but that tumors do frequently arise from continued local irritation, but to what extent hereditary predisposition acts as a predisponent is not yet settled. The very common idea that cancerous tumors are almost as hereditary as Roman noses is certainly wrong. That heredity plays no part in their production is equally incredible. Why, it plays an unquestionable part in the production of wooden legs, because the martial spirit which has exposed his inferior members to shot and shell is often "bequeathed from bleeding sire to son." It would appear from the clinical observations of Sir James Paget, confirmed by the microscopic ones of Mr. Butlin, that the processes of inflammatory new formation, of ordinary cellular infiltration, may pass, by a gradual commingling, into the process of cancerous infiltration with new cells genetically sprung from epithelium. Often also cancer is seen to attack localities which have long been the seat of syphilitic, of eczematous, or of some other chronic fissure or ulceration. It is possible that new growths may arise from irritation in a quite distant part. They can be removed in that way. I have seen a recurrent tumor over the scapula, which had shrunk gradually to one-eighth its former size during the progress of phthisis and fistula in ano. Such new growths as elephantiasis and bronchocele proceed from endemic, perhaps miasmatic influences. It is not impossible that malignant tumors are contagious, though there are no clinical proofs of it. Considering how slow most cancers are to infect the sufferer's own system (since early removal often effects a perfect cure), the absence of such proofs is not surprising. Certain localities and certain ages are specially subject to certain tumors: *e.g.*, lower lip of middle-aged to epithelioma. Sex generally acts in a manner easily explained. For ex-

ample, it is not difficult to see why men alone should have epithelioma scroti, women alone fibroid of the uterus, and women almost the monopoly of tumors of the breast. *Classification.*—Fatty tumor ; fibrous tumor ; cartilaginous tumor ; osseous tumor ; myoma ; neuroma ; vascular tumors ; sarcoma ; lymphoma, including glioma ; recurrent fibroid ; fibro-cellular tumor ; myxoma, etc. ; papilloma ; adenoma ; cystic tumors ; carcinoma.¹ The carcinomata, with most sarcomata and certain lymphomata, are often classed together as *malignant*, the rest being termed *innocent*. Malignancy means simply endowed with a tendency to infect the system. In diagnosing a tumor, the most important question to answer is that of innocent or malignant ? In some cases this is the only practical question.

FATTY TUMORS, LIPOMATA.—Two varieties, viz.: 1, Circumscribed ; 2, Continuous. The common fatty tumor belongs to the former variety. Best example of continuous lipoma is excessive double chin. *Cause.*—Usually unknown. Sometimes follows local irritation. Rarely appears in children or very old people. Continuous lipoma generally begins about age of forty. Female sex most liable. *Anatomy.*—Common fatty tissue surrounded by a fibrous capsule and divided into lobes by fibrous partitions. Sometimes outlying lobes project into the adjacent parts. Fibres connect the capsule with the skin and cause the latter to dimple. *Signs.*—Lipomata are soft, elastic, “pillowy,” movable, but causing the skin to dimple as they move. Normally without pain or tenderness, except a little aching from mere weight, and, in a few cases, a little pain, apparently neuralgic. Almost always single. Occasionally multiple. Bulk unlimited, even up to 50 lbs. avoirdupois. Multiple fatty tumors rarely grow to more than one inch in diameter. Growth slow. Their loose connections often permit fatty tumors to shift their positions under the influence of gravity. They are liable to cystic, cretaceous, and ulcerative degenerations. *Seat.*—Chiefly trunk and adjacent parts of limbs. *Diagnosis.*—When there is no cutaneous dimpling and they are unusually firm, they may be mistaken for cysts, or for fibrous or sarcomatous tumors, but the mistake is of no consequence. *Treatment.*—Let the continuous lipoma alone, unless restricted diet and judicious exercise will benefit it. Or give liq. potass., ℥ x., ter die, for a long time. Other single fatty tumors should be excised. Cut straight down upon the tumor, or into it if you like, and then dissect or tear it away from its connections. In dressing the wound, attend to drainage and proper adjustment of pressure and support. Multiple fatty tumors should be let alone as a rule. Lipomata are occasionally pendulous: these should simply be cut off.

FIBROUS TUMORS. FIBROMATA.—*Anatomy.*—Fibrous tissue variously arranged, sometimes in interlacing bundles, sometimes in concentric circles. Arrangement of fibres may or may not be visible to the naked eye. Section

¹ Paget adds: Neuralgic, Pulsating, Floating, and Phantom.

whitish or pale red in color. Consistence generally firm and elastic, sometimes quite soft. Mucous softening, serous infiltration, calcification, even true ossification not rare. Large cysts may form. Sarcomatous tissue (round or spindle cells) frequently mixed with the fibres—"fibro-sarcomata." Vascularity usually low. *Seats*.—Usually uterus, bones, nerves, cellular tissue near joints, sheaths of tendons, testicles, and ear-lobules. *Characters*.—Rounded or modelled to surrounding parts, smooth, non-lobed, firm, resistant, elastic, generally hard, occasionally soft. Of course degeneration alters their physical properties. Growth slow. Size unlimited. Pain absent. Commence in middle life. Those connected with nerves or bones sometimes commence in the young (after puberty). Number: periosteal fibromata usually solitary; but uterine and neuromatous fibroids, especially the latter, are more often multiple. *Diagnosis*.—"Consistence, locality, age, mode of attachment and form of the tumor almost always lead to its correct recognition." *Treatment*.—Remove thoroughly. Uterine fibroids require special consideration, and are neither to be rashly interfered with nor supinely let alone. *Recurrence*.—Pure fibroma probably only recurs when excision has been incomplete. But fibro-sarcomata may infect the system.

CARTILAGINOUS TUMOR—ENCHONDROMA.—*Anatomy*.—Resembles sometimes hyaline and sometimes fibro-cartilage. But pathological differs from normal cartilage in three respects, viz., (1) it is traversed by "*capsular-like*" communicating connective-tissue meshes; (2) these meshes are usually vascular, while normal cartilage has no vessels; (3) the intercellular substance may be gelatinous or friable. The section cuts gristly and is bluish or yellowish white, or the tumor may be softened or degenerated. *Locality*.—Chiefly the bones: metacarpals and phalanges of hand; femur, pelvis, etc.; parotids, testicles, ovaries, breasts, other glands. Frequently mixed with other tumors. *Age*.—Youth. "The younger the age at which a tumor of bone begins, the more it is likely to be cartilaginous, if its general characters agree therewith" (Paget). *Characters*.—Hard, nodular, incompressible, or perhaps very slightly compressible, with a very quick elastic recoil. Rarely soft, but even then very elastic. Rate of growth not characteristic. Size variable. Coincident ossification often occurs and alters character of tumor. *Diagnosis*.—Consider carefully locality, age, and rate of growth. *Prognosis*.—Purely cartilaginous tumors are as innocent and non-recurrent as any class of tumors. *Treatment*.—See ENCHONDROMA OF BONES, OF PAROTID GLAND, AND OF TESTICLE.

OSSEOUS TUMORS; OSTEOMATA.—See EXOSTOSES.

MYOMA.—A tumor consisting of muscle-cells or fibres. Pure myomata are unknown; but muscular elements, both striped and unstriped, occasionally are found in fibromata.

NEUROMA.—The surgeon often applies this term to any tumor situated on a nerve; the strict pathologist confines it to a tumor consisting mainly

of nerve-filaments or substance. The latter, so-called "true neuromata," are very rare, most tumors growing on nerves being *fibromata*, or *fibrosarcomata*. Usually multiple, often recurrent. Excision without injury to nerve itself rarely possible. As a rule best let alone. A *traumatic neuroma* is the bulbous end of a divided nerve. When painful, excise.

VASCULAR TUMORS—ANGIOMATA—NÆVI—ERECTILE TUMORS.—*Definition.*—Tumors composed almost exclusively of vessels held together by a slight amount of connective tissue. *Varieties.*—Three: (1) capillary, including common nœvi and "port-wine stains;" (2) venous, or cavernous angioma; (3) arterial, or pulsating, erectile tumors; with which may be placed "aneurism by anastomosis." *Etiology.*—Many are congenital (especially the first kind). The others usually commence in early childhood, excepting aneurism by anastomosis, which often develops in young people, after injuries. *Anatomy.*—(1) Capillary angioma consists of a mass of dilated capillaries, arranged in lobuli, each of which corresponds to the blood-supply of a single hair or cutaneous gland. The whole mass is of any size from a pin's head to a sixpence or a penny, or a much larger space, and of varying though usually trifling thickness. Color from deep red to slaty blue. But sometimes the skin itself is not involved, and it then may be of normal color. Redness disappears under pressure, so also does part of thickness of tumor when there is any perceptible thickness. Capsule, more or less defined. (2) Cavernous angioma consists of an assemblage of spaces filled with blood and resembling dilated veins, or, more accurately, the corpus cavernosum penis. In some of the spaces, chalky "vein stones" may be found. (3) Aneurism by anastomosis, or cirroid aneurism, is a convolution of dilated and elongated arteries. *Signs.*—Port-wine stains and ordinary nœvi are easily recognized by their color, and their congenital or early origin. All purely vascular tumors are more or less soft and compressible. The venous ones dilate during forced expiration. The arterial pulsate. *Seats.*—Mostly subcutaneous tissue of scalp, face, and trunk. Venous tumors not unfrequently occur more deeply, especially in orbit, tongue, inter-muscular spaces, and even in the liver. *Degeneration*, especially cystic, may occur. *Number* of nœvi in an infant often multiple. *Diagnosis.*—Rarely presents any difficulty except in the deeper venous and capillary tumors. These may be confounded with lipomata or cysts; but the possibility of partially or wholly emptying them, and the effect on them of forcible expiration, will often settle the question. *Prognosis.*—If let alone, they will occasionally progress till they cause deformity, weakness, and the absorption even of important parts. But they frequently remain stationary, or may even retrograde. *Treatment.*—1. By injection of tinct. ferri perchlor.; dangerous, especially in nœvi of head and neck. 2. By galvano-caustic, benzoline cautery, bulbous nœvus cautery, small sticks of lunar caustic driven into tumor. 3. By nitric acid (best for small and superficial nœvi). 4. By ligature: various modes, subcutaneous

and otherwise. 5. By compression. 6. By excision. Before excision, the base of the nævus may be surrounded by an elastic ligature, which should be tightened after pressing the blood out.¹ Thus the operation is rendered bloodless. Nævi, being encapsuled, may be excised exactly like any solid tumor. Balmanno Squire treats port-wine stain by systematic scratchings and cross-scratchings with a hot cautery-needle. Excision is probably the best treatment for aneurism by anastomosis.

SARCOMATA.—This most interesting group of tumors, whose association and nomenclature are mainly due to Virchow, includes the *fibrocellular*, the *mucous tumor*, and the *myeloid tumor* of English practical surgery; and the group, on the whole, nearly corresponds to Paget's *recurrent fibroid*. Therapeutic study and pathological study of these tumors have been, unfortunately, very independent of one another; consequently, the varieties of sarcoma have two quite different nomenclatures, one clinical and somewhat old-fashioned, the other scientific and chiefly German. The student has no right to resent this, unless he thinks that science and art should always be manacled together, and one never suffered to advance without the other. First, let us notice chief points in the anatomy of sarcomata, and in doing so, employ a strict pathological classification (after Billroth), viz., into (1) granulation sarcoma; (2) spindle-celled sarcoma; (3) giant-celled sarcoma; (4) stellate sarcoma; (5) alveolar sarcoma; (6) pigmented sarcoma.

Granulation Sarcoma, Round-celled Sarcoma (including *Glioma*), consists of corpuscles like those of lymph. Intercellular substance is homogeneous, striated, or reticulate, varying widely in amount.

Spindle-celled Sarcoma.—Cells acutely spindle-shaped. Intercellular absent or scanty, homogeneous or fibrous. Most recurrent sarcomata contain this tissue; but every spindle-celled sarcoma does not recur.

Giant-celled Sarcoma—Myeloid Tumor.—In addition to the structural elements of one of the other varieties of sarcoma, these tumors contain large cells with many nuclei, and often with many offshoots.

Net-celled Sarcoma—Mucous Sarcoma.—This is not exactly the same thing as myxoma. Myxomata are sarcomata of various kinds, but agreeing in having a gelatinous appearance. Net-celled sarcoma contain stellate cells with long processes and gelatinous intercellular substance.

Alveolar Sarcoma.—Very rare; great resemblance to carcinoma, but the cells are not so easily detached from the meshwork in which they lie. The cells are large, and usually lie each in a space to itself, "imbedded in a fibrous, or more rarely homogeneous, slightly developed intercellular substance of exquisite areolar type" (Billroth).

Pigmentary Sarcoma—Melanotic Sarcoma—Melanoma.—Pigment may occur in any variety of sarcoma. The pigment almost always lies in the

¹ W. H. Brown of Leeds.

cells. All the cells mentioned above as occurring in the different varieties of sarcoma are related genetically to corpuscles of the connective tissues (areolar tissue, bone, etc.). Consequently, the cells of a sarcoma are united by processes to the intercellular substance. In these two peculiarities, sarcoma is distinguished from carcinoma, the cells of which lie free in the alveoli of the cancer, and are genetically related, not to connective tissue, but to epithelial cells.

Naked-eye Appearances of Sarcomata.—These do not correspond very exactly to varieties in the kind of cell found under the microscope. In fact, several forms, *e.g.*, spindle-cell, round-cell, and giant-cell, are often found in the same tumor. Some sarcomata and fibrosarcomata are firm and tense, more or less lobed. On section, they are seen to be intersected with white fibrous bands; and, from the pale yellowish color of the section, an inexperienced observer might readily suppose them to be chiefly fat. They are very succulent and juicy when freshly cut. These are the *fibrocellular* tumors.¹ Other sarcomata, especially the “net-celled,” are of loose, gelatinous appearance, even so much so as to trickle away on section, like the vitreous humor of the eye. These are the *myxomata*. Others resemble lean “flesh,” and, on section, are seen to be blotched with red, though in the main gray, or yellow and shining. Such often contain giant-cells. Finally, tumors which will recur, or have already recurred, are very often soft, and, with each recurrence, tend to get more and more encephaloid or more and more gelatinous. Sarcomata are liable to cystic, calcareous, osseous, and mucous degenerations.

Symptoms of Sarcomata.—Distinct, encapsulated tumors. Usually rounded and smooth, often lobulated. Consistence varies from great firmness to the softness of jelly. When connected with bone, they frequently ossify. Cicatricial shrinkage very rare (this contrasts with carcinoma). Partial mucous softening and cystic degeneration frequently modify the consistence of a sarcoma. Ulceration occurs early in the course of superficial sarcomata, but is not usually very destructive. The tumor may then fungate.

The chief points for the *diagnosis* of sarcoma are thus concisely given by Billroth: “Sarcomata develop with peculiar frequency after precedent local irritations, especially after injuries. Cicatrices, also, are not unfrequently the seat of these tumors; black sarcomata may come from irritated moles. Skin, muscles, nerves, bone, periosteum, and, more rarely, glands (among these the mamma most frequently), are the seats of these tumors. Sarcomata are rarest in children, rare between ten and twenty years, most frequent in middle life, and rarer again in old age. According to my observation, men and women are affected with equal frequency. If these tumors be not located in or on nerve-trunks, they are usually painless till

¹ See p. 247.

they break out. If the sarcoma be in the subcutaneous cellular tissue or in the breast, it may be felt as an encapsulated movable tumor. The growth is sometimes rapid, sometimes slow; the consistence varies, so that it can scarcely be used as a point in diagnosis."

Topography of Sarcoma.—Glioma is connected with the neuroglia of one or other of the nervous parts. It occurs in the eyeball, or attached to one of the cerebral nerves, and is peculiarly a disease of childhood. Myeloid tumors occur in medullary cavity of long bones, but more frequently in lower jaw. When commencing inside a bone, they dilate it to a mere shell at the part affected. In those of the lower extremity, an aneurismal murmur may often be heard. Intraosseous sarcomata contain giant-cells, and are almost always solitary and innocent. But sarcomata which grow from periosteum are malignant, and generally more or less ossified: sometimes they are myxomata. Those sarcomata which originate in muscular interspaces, in fasciæ and in the skin, are almost always spindle-celled and recurrent, but (at all events, in the first place) not infectious. The typical recurrent fibroid is to be found among these.

In glands, a mixture of adenoma and sarcoma is more common than pure sarcoma. Cysts often form, and into these sarcomatous tissue may grow (proliferous cysts). Thus are formed *serocystic sarcomata*. Of the glands, the female breast and the salivary glands are most liable to sarcomata.

Fibrocellular Tumors are sometimes myxosarcomata and sometimes merely fibromata of an unusually soft and œdematous nature. Or they may be a combination of both.

Course and Prognosis of Sarcomata.—Some (*e.g.*, most myeloid tumors) are solitary, perfectly innocent; recurrence, when it takes place, being probably due to imperfect removal. Others are not less infectious and malignant than encephaloid carcinoma. 1. Those which grow rapidly are soft, and the softer the tumor the worse the prognosis. 2. The more simple and less differentiated the character of the microscopic elements of a sarcoma, the more dangerous it is. Recurrent fibroids, with each recurrence, are apt to become softer in consistence and more "embryonic" in microscopic structure. It is strikingly characteristic of sarcoma that it infects the system through the blood-vessels and not through the lymphatics (except in some rare cases quite late in the course of the sarcoma). Contrast this with carcinoma. Different sarcomata present every intermediate grade of infectiousness. Interval between recurrence very variable. Death eventually occurs, in malignant cases, either from the disease recurring in a part where operation is impossible, or from infection (often embolic) of internal organs. Number of secondary sarcomata unlimited. Their favorite internal sites are peritoneum, pleura, and lungs.

Treatment.—Depends to a certain extent on locality; but, as a general rule, prompt excision is indicated. In the case of mammary, subcutaneous,

intramuscular, and osteal or periosteal sarcoma, there need be no hesitation; but adenosarcomata of the salivary glands in elderly people are prone to extremely quick recurrence. Excision must be thorough, and include every offset. *Caution.*—Small sarcomata are occasionally overlooked when lying near larger ones. Esmarch claims for pot. iod. in large doses a curative power over recurrent fibroid.

LYMPHOMA.—(1) Idiopathic disease of the lymphatic glands, or (2) a tumor resembling a mass of lymphatic cells with a stroma of adenoid tissue but not situated in the site of any normal lymphatic gland. As, microscopically, almost all affections of lymphatic glands are indistinguishable, and as so-called “lymphomata” present every grade, from innocence up to intense malignancy, it is obvious that milder cases cannot be separated from mere secondary glandular inflammations or from scrofula. Indeed lymphomata, as a class, have been termed “scrofulous sarcoma.” But surgeons are generally agreed in setting apart from other glandular diseases, cases like the following: (1) One or more glands, in the neck usually, enlarge and resist treatment. Obstinate anæmia comes on. Suffocation by mechanical pressure may cause death; or the progressive anæmia—frequently with leucocythemia—proves fatal. Occasionally the disease is arrested by antiscrofulous treatment or even spontaneously. Various glands in other parts of the body often enlarge also. (2) Glands enlarge quickly to soft “medullary tumors,” the lymph-corpuscles simultaneously infiltrating the neighboring tissues. Anæmia and marasmus come on and advance rapidly to a fatal result. Excision is followed by recurrence. Systemic infection may take place. Prognosis is almost hopeless. *Anatomy of lymphoma.*—All the cellular elements of the gland are multiplied and enlarged; “the structure of the gland is gradually lost entirely; the whole organ becomes a mass of lymph-cells, although a fine network is generally preserved.” “The blood-vessels are preserved and their walls greatly thickened.” *Treatment.*—At first try antistrumous remedies, cod-liver oil, iron, etc. Iodine injections, electrolysis, and compression appear to succeed occasionally, but rarely. Excision may be performed when the glands are distinct and are causing local trouble. Billroth treats malignant lymphoma successfully with arsenic—liquor arsenicali, tinct. ferri, aa ℥. v., bis die. Increase by one drop every second or third day till symptoms of poisoning appear. Then diminish by one drop every second day. See *Allgemeine medicinische Central-Zeitung*, May 16, 1877.

PAPILLOMATA.—Include warts and horny excrescences. Papillomata are formed of hypertrophied cutaneous papillæ, covered by hypertrophied epidermis. Warts usually show each papilla, with its thickened epidermal covering, distinct to the naked eye. The ordinary wart is too well known to need description, but there is a disease described by Mr. Erasmus Wilson as *verruca confluens*, in which a considerable area of skin becomes the seat of a warty growth. Syphilitic and gonorrhœal condylomata are

more like hypertrophied granulation tissue than like true papillomata. *Causes.*—Unknown. Much more common before than after puberty. Irritating fluids, such as the hands of the post-mortem clerk are exposed to, often cause a warty state of the skin. *Treatment.*—Shave off the non-vascular summit and apply some caustic. Nitrate of silver, strong nitric acid, glacial acetic acid, acid nitrate of mercury. Milder applications may suffice, *e.g.*, strong tinct. ferri perchlor. For gonorrhœal warts, try powdered sulphate of copper, and for syphilitic, calomel, with oxide of zinc. Dr. Verco has observed a severe crop of common warts disappear rapidly during a sea-voyage. *Horny excrescences* in man are epidermal in structure with a papillomatous base. *Treatment.*—Shave off and thoroughly cauterize base or excise base. Some radical operation quite necessary, or they grow again, and may become starting-point of epithelioma.

ADENOMATA.—*Partial Glandular Hypertrophy.*—Tumors containing some proportion of glandular structure. This is usually mixed with some other tissue, and the relative proportions vary much. Thus are produced *adenofibroma*, *adenosarcoma*, etc. Microscopically, they are characterized by the presence of tissue resembling tubular, and sometimes racemose glands. By great dilatation of the tubules, cysts may be formed. In shape the tumors are usually round or oval, and lobed; but their other physical characteristics depend greatly upon the kind of tissue which accompanies the adenomatous—*e.g.*, an adenomyxoma would be very soft, an adenochondroma usually very hard. Any innocent, smooth, round, lobed, and elastic tumor situated in the breast, or in the parotid, is very likely to be, at all events partially, adenomatous. Billroth says that he considers true adenoma of the breast to be very rare, the glandular tissue found in mammary sarcomata being merely part of the original 'acini of the organ. Nasal, uterine, and rectal polypi are often partial adenomata; solid or semi-solid bronchoceles are adenomata. *Treatment.*—Pedunculated adenomata can be removed by polypus-forceps, by ligature, by écraseur, or by scissors, or by combinations of ligature and scissors. See POLYPUS OF NOSE, OF RECTUM, and OF EAR. For treatment of thyroid and mammary adenomata, see BRONCHOCELE and BREAST respectively. It may be shortly stated that excision is the usual treatment, but that no tumors are so frequently cured spontaneously, or without operation, as adenomata.

CYSTIC TUMORS—CYSTOMATA—CYSTS.—*Definition.*—"A tumor formed by a sac filled with fluid or pulp." *Varieties.*—The names of cysts have been given on principles nearly as various as those on which human beings have been named. Thus we have: I. (1) Simple and (2) compound cysts. II. (1) Extravasation; (2) exudation; and (3) retention cysts. III. (1) Serous; (2) synovial; (3) mucous; (4) blood; (5) sebaceous; (6) proliferous cysts. IV. Congenital cysts. The four classifications being based respectively on number, on mode of origin, on contents, and on period of origin. (Proliferous cysts are those which contain growths within them.

They are practically identical with "compound cysts." All other cysts are "simple.") *Causes*.—Extravasation cysts are due to extravasation of blood. They are usually traumatic. See HEMATOMA. Exudation cysts, at least such as are ordinarily regarded as tumors, are of unknown origin, except such as arise from local irritation. Retention cysts are due to obstruction of the orifice of some gland causing dilatation behind it. It ought to be noted that the class exudation cysts is by Virchow considered to include such serous dropsies as hydrocele, ganglion, and hydrarthrosis; while "retention cysts" include even dropsy of the gall-bladder, dilatation of the Fallopian tubes, and so on. We shall now consider the anatomy, diagnosis, prognosis, and treatment of each variety of cyst separately.

SEROUS CYSTS.—*Seats*.—Most commonly in or near glands, kidneys, thyroid, breast, sublingual, etc. When in the neck they are called "hydrocele of neck." They may occur almost anywhere and in any tissue. *Contents*.—Fluid usually thin, but sometimes honey-like, usually yellow and clear, but may be dark even to blackness. *Walls* of connective tissue lined with tessellated epithelium. *Number*, various. *Growth* is usually slow. *Diagnosis*.—Not difficult when the fluid is thin and the cyst not tensely filled; but a very tense cyst may be mistaken for a solid growth. The practised touch usually suffices to distinguish the fluctuation of a cyst from the elasticity of an adenoma, a fibrocellular, or other soft solid tumor. The latter are more likely to be lobed, and possess various special characters described above. Abscesses may be recognized by the history, and by considering locality, age, pain, etc. It is not often very important to make a diagnosis before puncturing. *Treatment*.—Puncture with trochar and canula, followed by pressure. Iodine injections. See BRONCHOCELE. Drainage: in large cysts, antiseptic precautions to be taken. Cauterizing interior. Free incision. Excision. Multiple cyst may require excision of a whole affected gland. When the cyst is not complicated with some recurrent, solid growth, and when operations on it are performed with due care, prognosis is most favorable.

MUCOUS CYSTS.—Type, *ranula*, *q. v.*

BLOOD-CYSTS—SANGUINEOUS CYSTS.—Are either serous cysts into which hemorrhage has occurred, or else hæmatomata. *Treat* on the same principles as serous cysts, and hæmatocele of the tunica vaginalis. Blood-cysts frequently occur in malignant tumors, in which they are, of course, of quite secondary importance.

CUTANEOUS CYSTS.—Under this head may be considered *sebaceous congenital cutaneous cysts*.

SEBACEOUS CYSTS are of two kinds, one of which shows the punctiform vestige of the orifice of the follicle by whose obstruction the cyst has been produced, whilst the other does not. The vestige above mentioned is a dark point which can usually be found. *Locality*.—Anywhere, but especially head and face. *Walls* usually soft connective tissue. *Contents*.—

White, pulpy epidermal matter, mixed with crystals of cholesterine, often offensively smelling. *Color* occasionally brownish, and consistence sometimes very soft. *Shape* round, smooth, often changeable by pressure. *Growth* slow. *Age* of first appearance, before middle age; but the surgeon is not usually consulted about them at first. They have to be diagnosed from chronic abscess and other soft innocent tumors. Note the characters mentioned above. Locality, history, absence of elasticity, and presence of the black point are important.

CONGENITAL CUTANEOUS CYSTS.—*Locality.*—In or near orbit, often deep-seated. May extend through aperture in bone, even into cranial cavity. Walls very thin. Contents usually turbid, oily fluid. *Size* small (half an inch). *Diagnosis.*—From *navus*, lipoma, and from serous cyst. Congenital cutaneous (dermoid) cysts occur also in other parts of face and neck, but always in the lines of the branchial clefts. Hence their possible origin from the accidental enclosure of dermal tissue when these clefts closed (Verneuil. See Wagstaffe, "Pathological Transactions," 1879). Congenital dermoid cysts of the head sometimes perforate the cranium, and then may be confounded with meningocele or encephalocele. This is not so serious a mistake as the converse. See MENINGOCELE. *Treatment of the Cutaneous Cyst.*—1. Dilate the black punctiform opening with a probe, and squeeze out contents. Repeatedly squeeze out if they reform till the sac has time to obliterate itself. 2. Cauterize (to the size of a sixpence) with potash or strong nitric acid. Afterward pull cyst out through the opening. 3. Incise skin over tumor, seize with forceps, and dissect out. Operation easy unless inflammation has taken place.

COMPOUND CYSTS—PROLIFEROUS CYSTS.—*Definition.*—Cystic tumors containing growths. When these growths are themselves cystic, the tumor is called a *cystigerous cyst*. But the growths are usually solid. Excellent examples of cystigerous cysts are furnished by many ovarian tumors.

NOTE.—Many cysts clustered together do not in themselves constitute a compound, but a multiple cystic tumor.

Anatomy of Proliferous Cysts.—The solid intra-cystic growths appear to grow from one point in the wall of the containing cyst. They gradually fill up the containing cyst, displacing the fluid which previously occupied it. Sometimes cysts and their contents cohere altogether, so that only the appearance of a section indicates that the tumor has ever been cystic at all. The nature of the intra-cystic growth is usually sarcomatous or adenosarcomatous. Their physical characters are as various as possible, flat or arborescent, soft or hard, pale or dark red. And they may be themselves cystigerous. *Diagnosis.*—Locality almost always some gland—breast, thyroid, etc. Their general characters resemble so closely those of adenoma and fibrocellular tumor, that unless palpation discovers evidence of fluid in some parts, and of solid in others, diagnosis will probably be impossible. Skin quite healthy unless the tumor fungates. Age—most com-

monly between thirty and forty. The chief practical indication is to distinguish them from cancer. This is done on the general principles by which other innocent tumors are thus distinguished. *Prognosis*.—Usually favorable. Prospect of recurrence if the whole tumor be not removed, or if the solid part of the tumor be soft and sarcomatous. *Treatment*.—Thorough excision.

CARCINOMATOUS TUMORS.—See CANCER.

Ulceration.—One of the “terminations” of inflammation. The destruction of a part by gradual molecular disintegration, distinguished from gangrene by the fact that in the latter process the dead particles cohere together after their death, and from masses visible to the naked eye, whereas in ulceration the disintegrated tissue falls away in granules or pieces of microscopic size, or else is absolutely liquefied. The liquid in which the particles flow away is called “discharge” or “ichor,” and varies with the character of the ulceration. *Chief Varieties of Discharge*.—1. Thin and serous, containing granules, *débris*, and sometimes a little diffused blood (sanguinolent), or a little pus (purulent). 2. Foul, quickly decomposing, sometimes containing shreds of gangrenous tissue. 3. Laudable pus, which consists almost entirely of serum crowded with pus-corpuscles, which are leucocytes escaped from the blood-vessels. Its creamy appearance well known. Contagious discharge may assume any of the above appearances. The first kind flows from spreading ulcers, the second from still more active ulcerations (phagedæna), the third from healthy, healing ulcers.

CLASSIFICATION OF ULCERS (Paget's).—I. (Type) Simple or healthy ulcer.*¹ II. Varieties depending on constitutional causes (eleven): 1, inflammatory; *2, eczematous; *3, cold; 4, senile; (*5, strumous; *6, scorbutic; *7, gouty; *8, syphilitic—strictly constitutional;) 9, lupous; *10, rodent; 11, cancerous. III. Varieties depending on local conditions (eight): 1, varicose ulcer; 2, œdematous; *3, exuberant; 4, hemorrhagic; *5, neuralgic or irritable; *6, inflamed; *7, chronic or callous; *8, phagedænic and sloughing. It is customary in describing an ulcer to notice its (1) locality, (2) shape, (3) size, (4) base, (5) border, and (6) secretion.

Simple or Healthy Ulcer.—Arises from loss of substance due to accident or to some pre-existing, but now past, diseased condition. Locality, number, shape, and size—very variable. Base—covered with small red granulations, not painful and not readily bleeding, neither raised nor much sunk below level of surrounding skin. Border—outer circle of thin white new epidermis, inner circle of still thinner (and therefore) blue epidermis.

¹ The thirteen varieties marked with an asterisk are the most important to remember. The rest are, so to speak, subsidiary either to other ulcers or to altogether special diseases.

Pus, if present, laudable. *Treatment*.—Merely protective, *e.g.*, simple ointment on lint, and avoidance of irritation. *Process of Healing*.—Identical with that of superficial wound with loss of substance.

INFLAMMATORY ULCER.—*Locality*: usually lower part of shin. *Shape*, irregular. *Size*: usually less than an inch. *Base*: without granulations, raw and sloughy. *Edges*, abrupt. *Discharge* thin, acrid, often blood-tinged. *Surrounding skin* inflamed, œdematous. *Causes*.—General causes of inflammation, especially constant local irritation, bad diet, old age, and drink. *Treatment*.—Rest, elevation, water-dressing, poultices, warm lead-lotion, followed in twenty-four hours by Martin's elastic bandage. Or the bandage may be applied without any preparatory treatment.¹

ECZEMATOUS ULCER.—Resembles the last-mentioned (inflammatory) in character, but appears in the middle of a patch of eczematous skin, in the vesicle of which it has often originated. Sometimes its immediate cause is a slight injury. *Treatment*.—Treat surrounding eczema, *e.g.*, with zinc ointment. But the sore itself must be managed as an inflammatory ulcer. Martin's bandage. Danger of causing internal disease by curing eczematous ulcer (?).

COLD ULCER.—Resembles chilblains, and occurs on fingers and toes of people with feeble circulation and cold, congested extremities, especially young women with deranged sexual function. Aloes, iron, warm gloves, thick boots, free exercise in open air. Dry lint. Stimulating lotions, *e.g.*, zinci sulph. (gr. iij.— $\bar{5}$ j.).

SENILE ULCERS.—Kind of *inflammatory* ulcer, occurring in withered old people. Nearly related to senile gangrene, with which it may be combined. *Vide* SENILE GANGRENE. *Locally*: resin ointment and Peruvian balsam.

STRUMOUS ULCERS.—*Locality*: neck, groin, knee, ankle, elbow, wrist, and sometimes elsewhere. Often multiple. *Shape*: oval when single. *Size*: small singly, but often very large by coalescence of several. *Edges* undermined. *Base* soft, granulations large, readily bleeding, œdematous. *Discharge*, thin, greenish pus. *Treatment*.—That of *scrofula*. *Locally*: stimulant. Ung. hydrarg. oxid. rubri, unguentum plumbi, lotio iodi (tinct. iodi c. aquæ), on strips of lint. Iodoform.

SCORBUTIC ULCERS occur in the course of scurvy, and are covered with crusts of the characteristic blood-clot deposit of scurvy. Indolent and livid. *Vide* SCURVY.

GOUTY ULCERS.—Superficial, indolent, occur in gouty parts, especially over gouty deposits. *Discharge* itself leaves a chalky precipitate. *Treatment*.—Water dressing. In absence of inflammation, sol. argent. nit. (gr. v., aquæ, $\bar{5}$ j.) may be used.

SYPHILITIC ULCERS.—Primary syphilitic ulcers (*i.e.*, chancres) may occur on lips, hands, etc. For their characteristics *vide* SYPHILIS. Secondary

¹The case must then be carefully watched, for there is a danger of erysipelas. Iodoform is a valuable application to any ulcer not actually inflamed.

eruptions rarely ulcerate: they are known by their concomitants. Tertiary are almost all the cutaneous ulcers named syphilitic. Commence in two ways: 1, cutaneously (usually in rupia); 2, subcutaneously (a gumma ulcerating outward). The two varieties agree in occurring anywhere, in having abrupt edges, in often being surrounded by a red areola, in being associated with a syphilitic history (perhaps merely congenital), and in benefiting by antisyphilitic treatment, especially iodide of potassium; but they differ considerably. 1. *That which begins superficially* has for its favorite locality the trunk. Shape: annular, crescentic, or circular. Size: various. Base: level, crimson. Granulations: small or absent. Discharge concretes into scabs, often rupial in character. Not generally simultaneous with any other syphilitic manifestation. One of the earliest tertiary manifestations. 2. Deep tertiary syphilitic ulcers are caused by a gumma finding its way outward through ulceration of the skin. Locality: anywhere—usually limbs near the large joints. Shape: rounded. Size: about an inch; usually multiple. Edges: abrupt. Base: excavated, often covered with “gummy deposit” sloughed. They have to be diagnosed from strumous ulcers. The latter have a pink surrounding area, the former usually a dusky red one. *Treatment* of tertiary syphilitic ulcer.—Locally: stimulant mercurial ointments, *e.g.*, ung. hyd. oxid. rubri, or ung. hyd. nitric-oxid. or lotio nigra; iodide of potassium, gr. v.–x. ter die. Small doses of liq. hydrarg. perchlor., etc. *Vide* SYPHILIS.

LUPOUS ULCERS, RODENT ULCERS, and ULCERATING EPITHELIOMA may be usefully contrasted as follows:

Lupous Ulcer.	Rodent Ulcer.	Ulcerating Epithelioma of the Skin.
<p>Locality: most frequently face, especially tip or ala of nose, upper lip, cheek. Female external genitals. Anterior, inferior part of nasal septum. Pharynx.</p> <p>Borders: abrupt, irregular, sometimes <i>slightly</i> elevated or thickened, very rarely undermined.</p> <p>Base: more or less level. Granulations nearly absent, or else coarse and dusky.</p> <p>Often scabbed over.</p> <p>Preceded by pink, firm, flattened tubercles.</p>	<p>Most frequently, cheeks, eyelids, upper lip, nose, scalp. Also vulva, vagina, areola of breast, near anus, etc.</p> <p>Abrupt; perhaps with low tubercles near, never undermined, not everted; tough, hard.</p> <p>Smooth, dull reddish yellow, looking half-dry and glossy, void of granulations. Base feels tough and hard, as if bounded by a layer of indurated tissue half a line to a line in thickness.</p> <p>Very little discharge indeed.</p> <p>Commences in some tubercular or scaly spot of long duration.</p>	<p>Great majority occur on lower lip, lower eyelid. Other places where skin and mucous membrane join, <i>e.g.</i>, anus, vulva, prepuce. Also scrotum, back of hand, and any other part of skin.</p> <p>Generally raised, everted, hard, nodular, warty.</p> <p>Uneven, concave, hard, nodular, warty, fissured. Coarse granulations. Base and surrounding parts hard, thickened and infiltrated with cancer.</p> <p>Often scabbed over when small.</p> <p>Begins in many ways—tubercles, warts, ulcers, fissures, cicatrices, etc.</p>

The course of each is destructive to every neighboring tissue. Progress usually slow, always sure. Lupus is often associated with scrofulous constitution. Rodent ulcer more frequently coexists with perfect general health. The same may be said of epithelioma, but epithelioma is, of all the three, most usually painful and productive of cachexia. Epithelioma alone involves, secondarily, the glands; and the infection may spread to the entire system. This is what constitutes its truly cancerous nature. Rodent ulcer would only be described as semi-malignant. The last sentence is meant to be understood in a purely clinical sense. Pathologically, "rodent ulcer" is as truly carcinomatous as epithelioma, according to Billroth.¹ Lupus is pathologically allied to tubercle, *quod vide*. *Treatment*.—Lupus: use Volkmann's erosion treatment, *i.e.*, scrape the disease away with some spoon-shaped instrument. Antiscrofulous remedies, cod-liver oil, etc. Rodent ulcer: thorough destruction with cautery or caustic. Benzoline cautery. Among caustics, arsenic is very convenient, but unsafe except in case of very small sores; nitric acid acts rather superficially; Vienna paste and chloride of zinc paste are the best deep caustics. For treatment of cancerous ulcers, *vide* CANCER. Esmarch and Billroth have had encouraging results from large doses of arsenic internally in cancer cases. Reasoning by analogy, the power of arsenic over psoriasis (superficial epithelial hypertrophy) suggests a possible power over cancer (interstitial epithelial hypertrophy). Lupus often returns. Rodent ulcer, if completely extirpated, rarely returns. Prognosis after operation for epithelioma depends on whether or not time has been given for glandular infection.

For other cancerous ulcers see CANCER.

SECTION III.—VARIETIES OF ULCER DEPENDING ON LOCAL CONDITIONS.—They do not need a full description, as each term owes its existence to some single important condition grafted on one or other of the ulcers already described. The nature of this characteristic, together with causation, diagnosis, and treatment, have to be considered.

VARICOSE ULCER.—Its characteristic is, that it owes either its origin or continuance mainly to the existence of varicose veins. Two direct modes of origin: (1) in suppuration over a thickened varix; (2) in eczema caused by obstructed cutaneous circulation. Form assumed by varicose ulcer is that of inflammatory, of eczematous, or of chronic ulcer, *q.v.* The *treatment* is according to the particular nature of the individual ulcers. But, always, either rest and elevation or else pressure. Martin's bandage. Give iron internally.

The terms *oedematous*, *exuberant*, and *hemorrhagic* refer to the state of an ulcer's granulations, and almost explain themselves. Oedematous granulations are usually connected with diseased bone. Exuberant granula-

¹ Paget inclines to the same view. But Thin says that rodent ulcer is an adenoma of the sweat-glands. Pathological Transactions, 1879.

tions have to be diagnosed, by their softness, from cancer. An ulcer may be hemorrhagic from (1) vicarious menstruation, (2) small and diseased varicose veins, (3) scurvy, (4) hemorrhagic diathesis, (5) phagedæna, (6) malignant disease, (7) mere accidental injury or congestion. In the case of œdematous and hemorrhagic ulcers it is necessary to treat the cause. Pressure and caustics will destroy œdematous or exuberant granulations. The popular name for the latter is "proud flesh."

NEURALGIC OR IRRITABLE ULCERS.—Usually more or less inflamed, or subject to constant irritation, *e.g.*, fissures round anus or mouth. If soothing ointments, cleanliness, and local rest will not cure them, a touch of solid caustic may. Carbolic lotion is an excellent local sedative. *See* ANUS, FISSURE OF.

INFLAMED ULCER.—Recognized by the presence of the four classical signs of inflammation in the borders of the ulcer. Surface of ulcer also changes, becomes "angry-looking," dusky, swollen, perhaps sloughy. *Treatment.*—Rest, elevation, weak carbolic or lead lotion. Purgatives. Occasionally, poultices are convenient.

CHRONIC, INDOLENT, OR CALLOUS ULCERS.—Seat: almost always the leg. Border thick, hardened, brawny, abrupt, covered with thick, old, opaque epidermis, and devoid of any delicate, new epidermis such as surrounds a healing ulcer. Base, sunken, pale, or dusky, without granulations, usually insensitive. Secretion, thin, offensive. Various kinds of ulcers attain this condition through neglect or continued irritation, combined with feeble local circulation. *Treatment.*—Above all, pressure. Martin's bandage. Baynton's dressing (strapping with adhesive plaster). Covering ulcer and its borders with a blister. *See* Syme's "Essays." Very few cases of uncomplicated chronic ulcer can now justify amputation.

PHAGEDENIC AND SLOUGHING ULCER.—*See* GANGRENE AND SYPHILIS.

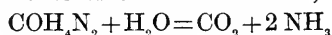
Urethra, Stricture of.—*Classification*: (1) spasmodic, (2) inflammatory, (3) organic. Organic are—A. Of neoplastic origin: (1) annular, (2) indurated annular, (3) diffuse or tortuous, (4) bridle, (5) caruncle, (6) traumatic; B. Of heteroplastic origin: epithelioma, etc.

Causes.—*Of Spasmodic Stricture*: almost always an organic predisposing cause, situated within the urethra. Dyspepsia or gouty diathesis with consequent acid state of the urine. Irritating diuretics, *e.g.*, cantharides. Some foreign body, *e.g.*, passage of a bougie or of a minute calculus. Some disorder of the central nervous system. *Of Inflammatory Stricture*: exercise, excitement, alcoholic or other excess during course of a gonorrhœa. *Of Organic Stricture*: the great majority arise from gonorrhœa, especially chronic gonorrhœa or gleet. Some follow non-specific urethritis. *Vide* causes of urethritis. Traumatic strictures follow rupture of the urethra. Hot climates. Abuse of alcoholic drinks, especially malt liquors. Neglect of proper treatment in gonorrhœa. Caustics. Syphilitic ulceration of meatus.

Position.—Spasmodic stricture occurs in various parts of the urethra. Inflammatory stricture is due to acute inflammation of the prostatic part. Of organic strictures, two-thirds are in the *bulbous* part of the urethra, *i.e.*, in the posterior inch of the spongy part (Thompson). This is denied by Otis, who says that strictures are most common in the penile part of the urethra. For confirmatory observations, see Lockwood, "St. Bartholomew's Hospital Reports," 1879.

Signs.—Earliest symptom is usually a slight gleet (almost all obstinate gleets are said to be caused by stricture). Sometimes retention is the first sign of all. Altered size and shape of stream—small, twisted, spitting, forked, or even divided. A few drops of urine trickle away after micturition has apparently been completed. Commencement of the act of urination difficult and slow, act itself prolonged. *Advanced Symptoms.*—Constant desire to make water. Night's rest broken. Straining. Sense of heat, soreness, and smarting about neck of bladder, "greatly aggravated by an excess of acid in the urine, by cold, or imprudence of any kind telling on the parts." Pain in pubic region, in perinæum, back, and loins. Pain during coition. Semen may recoil back into bladder. In some stricture cases a discharge like that of gonorrhœa may follow sexual intercourse. Anus shows effects of straining—prolapsus, and hemorrhoids. In a few cases, almost the only marked symptom is the liability to attacks of retention.

Urine tends to become alkaline and ammoniacal,



urea + water = carbonic acid + ammonia, is the reaction which represents transformation of urea into carbonate of ammonia. This ammonia irritates the bladder, causing cystitis. The urine contains also triple phosphates in abundance, as well as pus and mucus, owing to the cystitis. Occasional hæmaturia, from rupture of vessels near stricture during erection of penis.

Complications.—1. Dilatation of urinary passages and organs posterior to stricture—prostatic part of urethra, bladder, ureters, kidneys. 2. Atony and absorption of same structures; kidney may suffer great atrophy of its substance. 3. Inflammations and suppurations of the same parts, especially of bladder and kidneys. 4. Incontinence of urine. 5. Rupture of the urethra or bladder, and extravasation of urine. 6. Chronic abscess and fistula. 7. Constitutional effects. For most of the above complications, see notices elsewhere, *e.g.*, BLADDER, DISEASES OF, KIDNEY, URINE, etc.

Constitutional Effects.—Loss of strength. Impaired digestion. Thinness. Careworn look. Irritability. Despondency. Pains in back and loins. Feverishness of intermittent character. Urethral fever may be excited by the passage of a bougie, especially if the instrument be comparatively large. When there is organic kidney disease, catheterism almost always causes severe rigors. Then death may also ensue suddenly, perhaps from poisoning by urea.

Diagnosis is usually settled by passing instruments. History of case may help to demonstrate nature and cause of the stricture. Act of micturition should be observed.

Prognosis.—Very good if stricture be treated early. Serious, if neglect has allowed kidney disease to supervene.

Treatment.—The immediate treatment of strictures (whether inflammatory, spasmodic, or organic) in which there is retention of urine will be considered under the head URINE, RETENTION OF. Treatment of strictures in which there is no urgent retention. Varieties may be classed as follows: (1) dilatation, (2) rupture, (3) urethrotomy. These three classes include at least eight methods, viz.: (1) intermittent dilatation, (2) continuous dilatation, (3) vital dilatation, (4) rupture, (5) dilatation from behind—Jordan's operation, (6) internal urethrotomy, (7) external urethrotomy, (8) perineal section.¹ 1. Dilatation.—Instruments: silver, gum-elastic (English), or French catheters or bougies. The soft French instruments are preferred to silver ones by the majority of people accustomed to both. Sir Henry Thompson strongly recommends them. The English gum-elastic has the advantage that it can be moulded to any curve in warm water, and stiffened in the new curve by plunging it into cold water. Silver catheters permit their points to be directed with greater precision than soft ones. The advantage of using a catheter instead of a bougie, is only that the former instrument, by giving passage to urine, tells you when it has entered the bladder. French instruments usually taper near the end, but have the end itself nobbed to prevent catching in the urethral lacunæ. Hence the name "*bougie à boule*." The French sizes No. 3 to No. 21 correspond nearly to our No. 1 to No. 12: the number of each size of the former scale representing the number of millimetres in its circumference. Catgut and whalebone bougies are also used for very narrow strictures.

Rules for Ordinary Catheterism.—1. Patient may stand upright with his back against the wall; but as he may faint, it is safer for him to lie down on his back. 2. Stand on patient's right if he is lying down. Sit in front of him if he is upright. In difficult cases bring the patient to the foot of the bed, and stand between his legs. 3. See that your catheter is clean and not blocked up. 4. Warm it slightly. 5. Oil it well. 6. Steady the penis with your left finger and thumb, and, holding the instrument lightly between the thumb and two fingers of your right hand, pass its point five inches down the urethra, that is as far as it will easily go while the instrument is in its present position (that is to say, with its handle parallel to the patient's left groin). 7. Bring the handle up to the middle line of the abdomen, keeping the point of the catheter well down the ure-

¹ To these should be added dilatation by Wakley's tubes, which glide one over the other, and the smallest over a small silver catheter.

thra. 8. Lightly depress the handle, at the same time pushing the point onward round the sub-pubic curve into the bladder, employing only the slightest degree of force with the lightest hand possible. By "depress the handle" is meant "bring it downward, from the linea alba toward the interval between the thighs." When in the bladder, the catheter should be parallel with the thighs, or nearly so. Difficulties: (1) point may entangle in lacunæ in roof of urethra, or in a false passage; (2) or may be obstructed by the anterior layer of the triangular ligament, through which the urethra passes about six inches from the meatus; (3) or by spasm; (4) or by an elevation near prostate or neck of bladder. At first keep the point on the floor of the urethra. Always be patient and gentle. Force can do no good, and may cause much harm, especially false passages, hemorrhage, and pain. Gum-elastic catheter: be very careful to preserve its curve. When you have got the point well down the urethra, depress the handle rather suddenly, but still with a light hand. French soft instruments: simply push them gently on into the bladder. *Indications* for treatment of stricture: (1) to restore normal size of urethra (or to dilate as much as is consistent with safety and comfort); (2) to maintain the ground gained. At the first examination of a case of supposed stricture—1. Pass, or try to pass, a medium-sized instrument. If it passes very easily, try a larger and a larger, till you find the largest which passes without much pain. Note the size and position of the stricture. 2. If it will not pass, let the patient make water, if he can. The size of the stream will usually be a little larger than the diameter of the stricture. 3. If he cannot make any stream of water, carefully examine hypogastrium, to see if bladder be distended. A finger in the rectum to palpate base of bladder may assist in this examination. 4. If you have seen a stream of water, take an instrument a little smaller than that stream, and try to pass it. 5. But if there is no stream of urine, or if the instrument advised in last paragraph (4) have failed, try the smallest soft French catheter you possess. 6. If this fails, try your finest bougie or catgut or Thompson's probe-pointed catheter, or Maissonneuve's conducting bougie (if you possess them). Each instrument should have a fair and patient trial. Use plenty of good sweet oil. Sir H. Thompson directs it to be injected into the urethra. Another plan is to inject it in steadily at the very same time that you are gently pushing on your fine bougie. The stream of oil, entering the stricture, may carry the point of the bougie with it. 7. If the stricture resist all this, put the patient to bed, and if there is no immediate retention, reserve him to be treated as a difficult case. In the meantime, tincture of opium, hot baths, and rest in bed may bring his stricture to a state of easy permeability.

Dilatation, according to the ordinary plan, is thus managed. An instrument as large as the patient can comfortably endure is passed the first day. Then, at intervals of about two days, more or less according to the

patient's urethral sensibility, a larger and a larger size are passed, till No. 14 (English) is reached. Modern opinion is opposed to resting content with No. 12. If any attempt is made to hurry the steps of this treatment, the severest rigors and urethral fever may result. Some cases show similar serious symptoms if the surgeon tries to dilate beyond even No. 7 or 8. Such cases often get on very well with that calibre of urethra, and require no further treatment. Each instrument should be taken out as soon as it is passed. After ten minutes' horizontal rest, the patient may go about his business again, provided no unpleasant symptoms ensue.

Continuous Dilatation.—The instrument is not withdrawn for forty-eight hours, and then only to have a larger size substituted for it. This is an especially good plan (a) when the instrument has been introduced with difficulty; (b) when false passages exist; (c) if ordinary dilatation is ineffective; (d) if each introduction of the instrument induces pain or rigors. Of course the bed must be kept during the treatment (*i.e.*, for a week or two). The catheter or bougie, when in, can be fixed by tapes or strapping (*vide* works on bandaging, etc.), or by tying it with thread to the hair of the pubes, a direction which some critic of Smith's and Walsham's operative surgery has termed unpractical. Practical or unpractical, I have myself constantly practised it. A cradle keeps the bed-clothes off the hips, etc. *Liq. opii sedl.* ℥ xx., or morphia suppositories will relieve severe pain. Some patients cannot endure the treatment at all. Orchitis is a possible complication. Diarrhoea may require chalk mixture. Hemorrhage may occur. Slight purulent discharge accompanies the treatment.

*"Vital" Dilatation.*¹—When instrument will not pass through stricture, and there is yet no retention, pass a bougie down to stricture and leave it. Perhaps in a day or two it will pass.

Rupture by Holt's Dilators.—Mr. Holt passes an instrument consisting of two parallel blades, and then forcibly driving a tube down between them, ruptures the stricture. Give ether. Use sufficient force. Pass a No. 10 catheter immediately. Remove it at once, and pass it again at intervals of two days in first week, then once a week, then once a fortnight, lastly once a month. This plan has a great deal in its favor. See Mr. Holt's book.

Dilatation from Behind.—In certain cases, impermeable from the front, Mr. Furneaux Jordan has plunged a bistoury into the membranous part of the urethra, from the rectum, adjacent to which the membranous urethra lies. This is done by placing the patient in the lithotomy position, feeling for the anterior border of the prostate, and cutting exactly in the median line. Then a fine bougie is insinuated from behind forward, through the wound.

Internal Urethrotomy.—Various forms of urethrotome. Some cut from

¹ Dupuytren, *Leçons Orales*.

behind forward, others from before backward, in almost all cases with a guide previously passed through stricture. Division from behind forward preferred. Suitable cases are those strictures which either cannot be dilated beyond a small calibre, or which rapidly recontract after dilatation.

Operation (with Civiale's urethrotome): Ascertain position of stricture by means of bulb at end of instrument. Pass the urethrotome so far down the urethra that when the blade is projected the incision shall commence about $\frac{1}{2}$ inch beyond the stricture. Pull out the instrument, incising the urethra for about $1\frac{1}{2}$ inch altogether. There is no danger in a long incision, but real danger in incising very deeply. Proper depth about $\frac{1}{4}$ inch. As a rule, pass no instrument for forty-eight hours. Then pass a sound at intervals, which should gradually increase, commencing at every other day. Always press its curve well down into site of incision. Internal urethrotomy is relatively best, and absolutely excellent in the penile portion of the urethra. Mortality, 10 in 1,192 (Teewan).

*External Urethrotomy.**—Suitable cases are those in which "large, numerous, or obstinate perineal fistulæ coexist with old or obstinate strictures. When other treatment has failed, and the fistulæ refuse to heal, even although the patient has withdrawn for some weeks his urine entirely by catheter, no proceeding perhaps offers so good a chance of cure as this. It is for such cases I reserve it now."¹ *Operation.*—Pass Syme's staff. Lithotomy position. Best light obtainable. Operator sits. Incise in line of raphè, two inches. Feel for staff with left forefinger. Take staff in left hand, and straight bistoury in right. With right hand supine, cut through stricture along groove of staff from behind forward. Withdraw staff one-fourth inch, and extend incision that distance further forward. Shoulder of staff will now easily pass on through site of divided stricture if the division has been thorough. Thompson passes a concave, curved director through the wound and toward the bladder, with the aid of which a catheter (not smaller than No. 10) is afterward guided into the bladder. If catheter is obstructed on its passage, stricture requires more complete division, which should be done there and then. Morphia suppository. India-rubber tubing to catheter. Withdraw catheter after forty-eight hours. Pass No. 12 bougie at intervals, first of four days, then one week, then a fortnight, and so on. If any difficulty in passing this be experienced before wound heals, pass a grooved staff, and, with a tenotomy knife in the wound, divide the obstruction.

Rules for Managing a Stricture Impermeable to Ordinary Means.—It is assumed that there is no urgent retention. 1. Rest in bed without instrumental disturbance for three days or more. 2. Low diet, purgative, alkaline medicines, demulcent drinks. 3. Plenty of bed-clothing. 4. Opium, twenty drops of tincture; and 5, hot bath, 100°, rapid drying with towel, half an

¹ Thompson on Stricture, p 241.

hour before surgeon's attempts to pass an instrument. 6. During catheterism, expose only the genital organs. Cover trunk and arms with blankets. 7. Give ether. 8. *Commence with* the very finest soft French bougie you possess. If you have not a filiform one, snip off the bulb of a "*bougie à boule*." 9. While an assistant is in the very act of injecting oil into the urethra, glide your bougie, by the side of the nozzle of the syringe, down to, and if possible through, the stricture. 10. If that fails, try a catgut; but, if there are false passages, pass a No. 6 gum-elastic down to the stricture, and glide your filiform bougie down by its side. 11. As a rule, a perfectly new filiform bougie answers best, but occasionally the surgeon finds an individual one of particular merit, which he treasures up and uses again and again. 12. As the orifice of the stricture is not always in the axis of the urethra, the instrument should be conducted carefully first along one side of that passage, then on the other, then along the roof, then along the floor. The soft instruments can only be used in this way when the stricture is very near the meatus. Deeper strictures, when eccentric in position, require the silver catheter. (Thompson's probe-pointed catheter should be employed). 13. When an instrument has been passed at last, but with great difficulty, it should be left in a considerable time, say forty-eight hours, careful note being made of the particular manœuvre which proved successful. Instead of withdrawing it to make room for a larger size, a Wakley's tube can, with advantage, be passed over it. Wakley's tubes are of various sizes, and glide over the originally introduced catheter, which acts to them as a guide. 14. Whatever method is tried should have a fair trial. Fickleness is very likely to result in failure. 15. The attempts, if necessary, may be renewed on a future day. Suppose, however, one of those rare cases of genuine impermeability. The stricture may be near the meatus. Of course there will be false passages. In such a case I saw Mr. Furneaux Jordan pass a very sharp, fine-pointed bistoury into the glans where the meatus ought to have been (the meatus was itself occluded, and the last quarter or half inch of the urethra too), and fortunately or skilfully hit the urethra beyond. No trace of a meatus had remained, the surface of the glans being merely cicatricial tissue. If the impermeable stricture be in the penile part of the urethra, but not near the meatus, divide it subcutaneously, that is, pass a grooved director down to the stricture. Feel the size and position of the stricture with the finger and thumb, from the outside. Then, observing your landmarks carefully, and having the penis well and steadily held up on your director, pass a sharp tenotome through the skin opposite the end of the director. Next, without enlarging the skin-wound, and cutting always in the middle line, divide the stricture. When the tenotome has once reached the urethra on the proximal side of the stricture, the division can be accurately and thoroughly completed on a grooved staff. For genuine impermeable stricture in the bulbous part of the urethra, perineal section must be done, or the

bladder may be punctured, after which catheterization may be possible, owing to the repose which the stricture thus gets from pressure *à tergo*. For treatment of *Retention*, see RETENTION OF URINE.

Perineal Section.—This operation resembles external urethrotomy, but differs from it in that the stricture, being impermeable, is not divided on a staff, but is carefully dissected through. The surgeon requires an excellent light. He should use all his knowledge of anatomy, constantly refer to the landmarks which are visible or palpable, and will do well to make the starting-point of his dissection the juncture of the distal part of the urethra with the stricture, a point which can be fixed by the end of a staff passed down to it. *Work throughout in the exact median plane of the body.* The details of this operation have been admirably worked out by Wheelhouse, of Leeds. He uses a staff with a button-like end. Urethra is opened a quarter of an inch in front of stricture, the orifice of the latter being then searched for with the probe. See *British Medical Journal*, June 24, 1876.

Accidents of Stricture are perineal abscess, perineal fistula, penile or ante-scrotal fistula, retention of urine, each of which is noticed in its alphabetical place.

False Passage is a common effect of rough catheterism. *Treatment.*—If there is retention, the bladder may be reached sometimes by passing first one middle-sized instrument, then a fine catheter beside it. Otherwise, it is best to suspend attempts at passing instruments till the false passage has had time to heal. An instrument in a false passage moves freely, one in a stricture is gripped more or less tightly. Macleod, of Glasgow, recommends a course of quinine during the treatment of stricture. It is not unreasonable to think that it might act as a prophylactic against septicæmia.

Urine.—Normal urine is clear, pale amber-colored, of specific gravity not greater than 1030, and acid in reaction. It does not respond to the tests either for albumen or for sugar, and it does not deposit urates as it cools. From thirty to fifty ounces are usually passed in the twenty-four hours.

The chief *urinary deposits* are urates, phosphates, and oxalates, casts of the renal tubuli, mucus, and pus. Blood may be diffused in the urine, or even be passed *per urethram*, almost unmixed with urine. Grape sugar may be present in solution. Epithelium, bile-acids, bile-pigment, spermatozoa; certain constituents of the food may also be found, *e.g.*, in the strong-smelling urine passed after eating asparagus. The acidity of healthy urine probably due to presence of acid sodium phosphate. When a free acid is present, "the reaction to test-paper is far stronger, and the liquid deposits on standing, little, red, hard crystals of uric acid; but this is no longer a normal secretion" (Fownes' "Chemistry," eleventh edition). Alkalinity of healthy urine very rare, and then due to neutral potash or soda salts of vegetable acids (*e.g.*, tartrates, citrates, and acetates) taken into the

stomach. Alkalinity in retention cases is due to fermentation, which forms ammonium carbonate from urea.¹

Urates usually red, but vary from pale yellow to purplish. Readily dissolved by heat.

Phosphates may be thrown down from neutral urine by boiling, but dissolve instantly when a drop of nitric acid is added. Contrast with albumen. Phosphates are most abundant in the alkaline, muco-purulent urine of chronic cystitis.

Oxalate of Lime is recognized, under the microscope, by its dumb-bell and octahedral crystals.

Renal Casts, found often in albuminous urine. Basis usually fibrin. May be waxy or fatty. May contain blood or pus-corpuscles or epithelial cells.

Mucus may occasionally come from the prostatic urethra, and consequently be only accidentally mixed with the urine. Patient then generally passes it toward end of act of micturition. But mucus and pus, existing together, are usually accompanied also by phosphates and an alkaline reaction. Urine reacts also to tests for albumen.

Pus, unmixed with mucus, if diffused, is probably from kidney; if not diffused, is from an abscess opening into bladder or urethra.

Blood in the urine may come from kidney, ureter, bladder, or urethra. Very unlikely to come from ureter, even in case of injury to abdomen. If renal, blood is diffused, producing "smoky" urine; if vesical, less likely to be entirely diffused, almost sure to pass partly pure; if urethral, is likely to pass quite independently of urine, sometimes without micturition, sometimes immediately after micturition. Bloody urine is necessarily albuminous. Sham hæmaturia sometimes produced with coloring matters by impostors.

Grape Sugar increases specific gravity of urine, imparts a sweet odor, and increases flow of urine (diabetes). Trommer's test: add a few drops of solution of cupric sulphate to urine, then add excess of liq. potassæ, lastly boil; a red precipitate (cuprous oxide) is quickly thrown down. Pavy's test-pellets are handy.

Bile-pigment.—In cases of jaundice, sufficient bilirubin may exist in urine to answer to Gmelin's test. "Treated with oxidizing agents, such as nitric acid yellow with nitrous acid, it displays a succession of colors in order of the spectrum. The yellowish golden red becomes green, this a greenish blue, then blue, next violet, afterward a dirty red, and finally a pale yellow" ("Foster's Physiology").

Epithelium and *Spermatozoa*, as well as casts and crystals, are discovered by the microscope.

For the value of the above deposits, etc., see the sections treating on

¹ In addition to what follows, concerning urinary deposits, see CALCULUS.

Diseases and Injuries of Bladder and Urethra, Abdominal Injuries, Impotence, Calculus.

URINE, RETENTION OF.—A term applied only to acute stoppage of the urethra, and never to mere habitual difficulty in urination. *Varieties*.—(1) Retention from organic stricture, (2) from inflammation, (3) from spasm, (4) from internal obstruction, *e.g.*, by calculus, (5) from external pressure, *e.g.*, by abscess, (6) from enlarged prostate, (7) from hysteria, (8) from operations on pelvic or even on distant regions. *Causes*.—Partly indicated in the last sentence. But the exciting cause of retention, whether purely spasmodic, or arising in the course of organic stricture, or of gonorrhœa (inflammatory retention), is usually drink or exposure to cold. Besides gonorrhœa, various drugs, *e.g.*, cantharides, ergot, and even quinine, will sometimes temporarily close the urethra (by spasm or inflammatory effusion or by both?). The predominance of certain causes depends greatly on the age. In children the least rare are impaction of a calculus or a foreign body, a string tied around penis, an injury to the perinæum, abscess, phimosis, and adherent prepuce. In adults the most common are alcohol and cold during organic stricture or gonorrhœa. Rarely too strong urethral injections. In old age the chief cause is prostatic hypertrophy. *Symptoms*.—An adult in his senses of course knows that he cannot pass his urine properly. But adults when delirious, or prostrate, or insensible, and children when young, may present no direct or striking sign of retention unless it be looked for. The bladder usually rises in the abdomen, making dull successively the hypogastric and even the umbilical regions. But in old cases of stricture, the bladder may be organically so contracted that it would rupture before distending enough even to rise out of the pelvis. *Diagnosis*.—The most dangerous mistake is that of taking a case of retention with overflow for one of pure incontinence. Always catheterize if there be the slightest doubt. In *suppression of urine* the bladder is nearly or quite empty, and the symptoms belong rather to the kidneys and nervous system (*e.g.*, lumbar pain and afterward coma), than to the bladder and urethra. *Prognosis*.—If unrelieved, great danger of rupture of urethra, extravasation of urine, urinary abscess and fistula, or even gangrenous cellulitis and death. But this does not apply to hysterical retention; nature usually remedies that herself after a time. *Treatment*.—Hot bath (104°), liq. opii, ℥ xx., then bed and warm blankets. Catheterize at once (except in hysterical cases). For spasmodic stricture use a No. 5 soft French catheter warmed by friction and well oiled. For organic stricture try the same instrument. If it does not pass at once adopt the measures detailed on pp. 262 and 263. If they fail to lead you to the bladder, and if his retention be complete or nearly so, the patient must not be left unrelieved. Aspiration above the pubes is perhaps the safest and best means of affording immediate relief. Other methods are (1) suprapubic puncture with a small trochar and canula, directed backward and

downward, (2) puncture per rectum, (3) opening the urethra behind the stricture, (4) "perineal section" proper, *i.e.*, without a guide. If the surgeon never hopes to open the urethra satisfactorily again, he had better perhaps adopt plan 1. If he knows the stricture to be of that class for which Syme recommended external urethrotomy, and if he have confidence in his own skill, he is justified in attempting to cure both retention and stricture by plan 4. In other cases his choice undoubtedly is practically confined to aspiration and puncturing per rectum. When retention is caused by impaction of a calculus or foreign body, the obstruction must be withdrawn if possible; but if it cannot be extracted per urethram, it had better be pushed back into the bladder, and reserved for further treatment, *e.g.*, crushing by lithotrite, or extraction through a median perineal incision.

Uvula, Cleft.—Slightest grade of cleft palate. Pare edges and unite with fine sutures.

UVULA, RELAXED.—Usually part of a general condition of pharyngeal catarrh. Often causes troublesome cough. Astringent gargles. Touch with silver nitrate. Tonics. Stomachics. Attack cause, *e.g.*, over-indulgence of any kind. Or seize the extremity with forceps and cut it off.

Vagina, Imperforate.—Usually a mere adhesion of opposite vaginal walls, easily torn open, and prevented from readhering by oiled cotton-wool. Not to be confounded with a very serious malformation, *viz.*, *Imperforate Hymen*. This latter condition causes retention of the menstrual fluid till long after puberty. The *treatment* is to open by incision. Danger of resultant inflammation spreading to peritoneum. (Open with anti-septic precautions). Vagina may be a *mere cul-de-sac, associated with arrested development of uterus and ovaries*. To diagnose the latter condition, examine (1) with catheter in bladder and finger in rectum, (2) with speculum. Nothing can be done.

Absence of Vagina occurs in rare instances.

VAGINAL FISTULE.—(1) Vesico-vaginal, (2) urethro-vaginal, (3) recto-vaginal. *Causes.*—Laceration or sloughing, the result of difficult labor, or, more rarely, of accident. Syphilis. (Fistulae from cancer are so irremediable as to be best not considered here.) *Symptoms.*—Incontinence of urine or of feces. But the latter may not occur unless the rent is very large or the feces fluid. Flatus may escape and little or no feces. Seat and extent of fistula must always be determined by combined digital and specular examination. Catheter often useful. *Treatment.*—Purely operative. Caution may be tried in very trivial cases. *Instruments.*—Duck-bill speculum, long straight and long angular knives, long forceps, tubular needles, with Startin's handle, wire-twister, long curved scissors, long soft india-rubber catheter, silver wire, silk, handled sponges, etc. Chief points of operation are ten: (1) Health good. (2) Rectum empty. (3) Position—lithotomy. (4) Nates held widely apart by assistant. (5) Duck-bill

speculum. Operator will occasionally hold this himself, but usually hand it to an assistant. (6) Drag the fistula toward the vaginal orifice. This may be done in various ways, *e.g.*, with a blunt hook, or by one of the sutures. (7) *Thoroughly* pare the edges on the vaginal side; (8) but do not meddle with vesical mucous membrane. (9) Sutures must not enter bladder, nor be pulled too tight. (10) Sutures should enter and leave about half an inch from edges of wound. As soon as operation is done, place, secure, and leave flexible catheter in bladder. This should be cleaned twice daily. Patient now lies on her side. Unless untoward symptoms arise, leave sutures in ten days.

Operation for recto-vaginal fistula is precisely similar. Keep bowels confined for ten days. "Whether or not the sphincter ani should be divided will depend on the degree of tension which is present when the parts are brought together. It is not a slight measure and should not be heedlessly resorted to" (Hutchinson in Holmes's "System"). Wash out vagina daily with a syphon. In operations about the vagina, remember the erectile tissue which lies immediately beneath the mucous membrane, and, therefore, remove the latter with delicacy, to avoid hemorrhage. Such hemorrhage I have seen instantly controlled by hot-water injections (temp. 120°-130° Fahr.).

VAGINA, FOREIGN BODIES IN, generally pessaries or sponges, may cause a false diagnosis of metritis, leucorrhœa, or even cancer, patient forgetting their presence. Sometimes they have to be removed piecemeal. Pessaries have for years remained unsuspected in the vagina, causing foul discharge, etc.

VAGINA, INFANTILE TUMORS OF.—Very rare. *See* T. Holmes in his "System," vol. v., p. 851.

VAGINA, LACERATIONS OF.—Usually the result of parturition, occasionally caused by broken chamber-utensils or by assaults, etc.; in rare instances, even by bridal intercourse. *Treatment*.—Trivial cases require only rest, silver nitrate, etc.; medium cases require sutures, and, if neglected at first, eventually operation for recto- or vesico-vaginal fistula. Severe cases may cause collapse and rapid death. Complete circular rupture of vagina, with expulsion of uterus, has been known during parturition! And this, also, without violent instrumental interference.

VAGINAL PROLAPSUS,

VAGINAL TUMORS OF ADULTS, and

VAGINAL DISCHARGES, NON-GONORRHOEAL, are apt to be so intimately connected with uterine affections that they are most fully treated in Gynecological works.

NON-SPECIFIC VAGINITIS OF CHILDREN may cause evil suspicion; but the affection should always be presumed to be innocent, unless there is collateral evidence to the contrary. *Cause*.—In some cases the passage of thread-worms from rectum to vagina, and local irritation. Struma?

Treatment.—Local cleanliness, dryness, and mild astringents. Attend to general health.

Varicocele.—Sometimes no less than seven causes of varicocele are given! And all these exist in every healthy individual, old or young, yet varicocele is almost unknown in young children and old people. Quite sufficient causes are to be found in the lax nature of the scrotum, and in the amount of violent congestion to which the spermatic veins are subject in many young adults. The left side is oftenest affected. Several reasons have been given, *e.g.*, rectangular juncture of left spermatic vein with renal, and relation of former vein to sigmoid flexure of colon. Neither of these reasons will bear strict criticism. The left side of the scrotum is almost always larger than the right, and therefore laxer, as the left testicle is no larger than the right. The veins are enlarged, lengthened, and thickened. The enlarged veins coil around the cord and against the testicle in such a way as to feel “like a bag of worms.” Increase on standing. Decrease on lying down. Impulse (slight) on coughing. Often aching pain and tenderness. Depression of spirits. *Treatment.*—I beg to recommend the suspensory bandage which I have myself contrived. If properly fitted, it removes the venous congestion as soon as applied, and will often substitute for low spirits and aching pain a feeling of brightness and of being well braced up. Other local apparatus are Wornald’s ring, the common suspensory bandage (generally inefficient), Morgan’s (of Dublin) suspender; an inguinal truss (which is said to “sustain” the column of blood above, though it manifestly must equally obstruct the flow of blood from below). Cold douching. Attention to the digestive system and bowels. Correction of evil habits. Operations for varicocele are not unpopular with some, who, by good luck, have had no shocking accident from embolism. Operation is justifiable when a patient finds it urgently desirable to pass into the public service without delay, or when a varicocele causes severe symptoms and will not yield to milder measures. Atrophy of the testicle said to be caused by varicocele. Many of the effects attributed to varicocele in certain cases are quite as much due to genital irritation of which the varicocele is itself a result. *Operations.*—Two kinds and many varieties. Both subcutaneous, in one the veins are merely constricted, in the other they are constricted at two points and divided intermediately. The vas deferens (easily recognized by its cord-like feel) must be slipped well out of the way: the spermatic artery lies close to it. Lee’s operation is probably as good as any. In it the veins are constricted in two places by needles beneath them and figure-of-8 ligatures over them. As these ligatures are not subcutaneous, they must not be tight. A tenotomy knife divides the veins intermediately. On the 6th day, remove needles. Bed for three weeks: then suspensory bandage.

Varix.—Dilatation of veins. *Causes.*—Mechanical obstruction (*e.g.*, varix of saphena from pressure of pregnant womb on external iliac vein).

Occupations in which there is much standing, *e.g.*, those of laundress and shopwoman. Such influences as the above act chiefly on persons with an individual or a family predisposition, and on certain localities, namely saphenous and spermatic veins, and their radicles. It is said that the deep veins of the legs are nearly as often affected as the superficial. Frequently the minute cutaneous venous radicles are alone affected. This often occurs in the face, and is frequently hereditary. *Pathology.*—Hypertrophy as well as dilatation of the venous coats, of the muscular as well as the fibrous elements. Dilatation sometimes regular, sometimes saccular. Extent varies from a small part of one vein to nearly all the veins of one or both lower extremities. As the valves do not grow proportionally, they soon become insufficient. Thickening of connective tissue round the veins. This may increase to general thickening of whole limb. Œdema from difficulty of circulation through the dilated veins with inefficient valves. Œdema leads to eczema: eczema to “varicose” ulceration. Occasional bursting and hemorrhage. This may lead to ulceration. Coagulation in certain parts of the vein, generally near valves, “phlebolites.” *Symptoms.*—No person who has seen one varicose vein can fail to recognize another; but when such a vein is surrounded by brawny tissue it may escape the sight: it can then be felt as a soft, subcutaneous “channel.” Color varies from flesh-color to purple; usually bluish gray. Aching pain after long standing. Varix of spermatic vein may cause neuralgia and mental depression. See *Varicocele*, above. Varicose veins, when inflamed, become hot, tender, etc. *Prognosis.*—Easy to alleviate. Almost impossible to cure without operation—which is rarely justifiable (or entirely effectual when disease is extensive). *Treatment.*—Support by pressure of (1) elastic bandages, (2) elastic stockings, (3) common bandages—preferably starched, (4) strong lace-up stockings. Avoid standing or long sitting with legs dependent. Regular but moderate walking with legs well bandaged. Attend to bowels and general health. Iron. Horizontal rest in middle of day for an hour or two. Bathing in cold water after exercise. Elastic stockings should fit well, and are somewhat expensive, since they do not wear so long as bandages. *Operations.*—A proceeding similar to one or other of those described above under head of varicocele, is applied to as many parts of a varicose vein as may be required to obliterate it, *e.g.*, the vein may be compressed in several places between needles passed beneath it and strips of india-rubber stretched over it (outside the skin), and subcutaneously divided between the points of acupressure (Lee). Caustics and injection of a drop or two of perchloride of iron have been used and recommended, the latter as an adjunct to acupressure (Bryant). Operation of excision of varicose vein with antiseptic precautions (spray, etc.) is much practised at Guy’s Hospital by Howse and others. It is neatly described by Dunn in “St. Bartholomew’s Hospital Reports,” 1879.

Veins, Inflammation of.—A subject which in most surgical works is

considered as if inseparable from Thrombosis. The separation is really difficult; but the mixture generally plunges the cautious student into doubt and confusion as to what he is really reading about. Let it be premised that (1) inflammation of a vein is apt to lead to thrombosis in it, but does not necessarily do so; (2) that it is sometimes impossible to diagnose whether a given case is phlebitis with or phlebitis without thrombosis; (3) that thrombosis is almost sure, unless quickly resolved, to lead to changes in the vein obstructed; (4) that many cases called phlebitis are really cases of periphlebitis, *i.e.*, of inflammation of the cellular tissue around the vein; (5) that the concurrence of thrombosis is generally the most serious part of a case of phlebitis. Hence in treating any case of phlebitis or periphlebitis, the idea of thrombosis and of its possible consequences—*e.g.*, solid œdema and pyæmia—never leaves the surgeon's mind.

PHLEBITIS.—*Causes.*—Injury, *e.g.*, phlebitis of saphena following a dog-bite, thrombosis or embolism, gout, obscure influences, possibly presence of irritating materials in the blood. Varicose veins particularly liable. Paget, classifying phlebitis according to its causes, gives eight kinds, *viz.*: (1) from injury, (2) from exhaustion, (3) from propinquity of inflamed or otherwise diseased parts, (4) rheumatic, (5) pyæmic, (6) puerperal, (7) gouty, (8) from poisoning by foul drains. Some of these causes are qualified in the original lecture. See Paget's "Clinical Lectures." *Symptoms.*—Redness, hard swelling, tenderness, more or less pain in the course of a vein or of part of a vein. Swelling sometimes knotty, knots said to correspond to seat of valves. Œdema in parts whence the vein should drain blood. Sometimes visible enlargement of collateral veins. If suppuration occurs, there is local softening and general rise of temperature. Perhaps a rigor. *Diagnosis* has chiefly to be made from lymphangitis. It depends on the situation of the redness, etc., and on the width of the band of inflammation (greater in phlebitis). Glands also more likely to be enlarged in lymphangitis. *Pathology.*—Inflammation of the vein itself is almost always preceded by thrombosis; and, when not preceded by thrombosis, it is probably secondary to periphlebitis. The experiments of modern pathologists, *e.g.*, Lee and Callender, certainly prove that the older pathologists were accustomed to mistake mere thrombosis for an exudation of lymph from the wall of the vessel, but, to my mind, considering the anatomy of the veins, and arguing analogically, they are not numerous and severe enough to prove that exudation of lymph never takes place; and they most assuredly do not justify the dismissal of true phlebitis from our nosology. But any thickening of the outer or of the middle coats, or roughness of the inner coat of an inflamed vein, is so rarely found, independently of thrombosis, and is, in itself, of such small importance, that the most interesting pathological features associated with phlebitis must be sought for under the head of venous thrombosis. *Prognosis.*—*Vide Venous Thrombosis.* *Treatment.*—Rest. Elevation, gentle and even pressure. If a common

roller be used, place a layer of cotton-wool beneath for the sake of elasticity. Regulate bowels. Moderate or low diet. If abscess threatens, it may be poulticed, fomented with hot water, and opened early. Extensive cases of solid œdema from venous obstruction are rarely entirely cured, some thickening remaining. As ammonia readily enters the blood and, when there, retards coagulation, there is a rational indication for giving it in cases of phlebitis. I believe Dr. Richardson has demonstrated its value in cases of thrombosis. The carbonate in large doses would be the best form to administer.

Concerning *gouty phlebitis*, Paget says it is "either associated with ordinary gouty inflammation in the foot or joints, or occurs, with little or no evident provocation, in persons of marked gouty constitution or with gouty inheritance. Not rarely it has peculiar marks, especially in its symmetry, apparent metastases, and frequent recurrences." *Treatment*.—Employ same means as in managing gout affecting other external parts, especially rest and elevation. When vein affected is large, rest should continue a month from date of last marked attack of pain, to lessen risk of embolism.

VENOUS THROMBOSIS.—Formation of a clot in a living vein. *Causes*.—(1) Injury to a vein, *e.g.*, a wound. This may act either by causing a roughness or projection into the calibre of the vein, or by obstructing the flow of blood altogether. (2) Constriction. This is probably the way in which inflammation external to the vein usually acts: the immediate effect is to slow the blood-current. (3) Dilatation, by retarding the flow of blood, will produce thrombosis, *e.g.*, occasionally in varicose veins. (4) Another cause analogous in mode of action to the last two is constitutional debility, "marasmic thrombosis." (5) The entrance of an irritant or of septic poison into the blood. (6) Thrombosis in one vein may be merely the result of extension into it of a clot from a neighboring vein, *e.g.*, in certain cases of "white leg," obstruction of external iliac has spread up from uterine veins through internal iliac. (7) Gout.

Pathology.—When first formed, clot usually small, rarely large. Increases by laminar deposits. Usually fills the vein: rarely leaves a channel beside it, *i.e.*, between it and the wall of the vein. Sometimes spiral in shape. Soon adheres to vein-wall. (In all above respects, it contrasts with post-mortem clots.) In time, come (1) changes in the clot, (2) changes in the vein itself, (3) changes in the peri-venous tissues. To these may be added (4) changes in the parts formerly drained by the vein. The clot may either (1) disintegrate and pass into the circulation, or (2) organize into a fibrous band united with the vein, or (3) that part of it first formed may melt into a puriform fluid—differing from true pus in containing granular *débris* and not corpuscles. In this case the portion of clot last formed almost invariably remains to shut off the liquefied part from the circulation, or (4) the white corpuscles which wander into the clot may, instead of converting it into a fibrous mass (as in case 2), be the

agents in forming true pus within the vein, or (5) a portion or the whole of the thrombus may be washed away, thus becoming an embolus. When suppuration occurs in the course of a thrombosis it must be understood that the pus is usually in the first instance *outside* the vein. The course taken by the vein and its contained thrombus is almost always identical with the changes taking place in the cellular tissue around the vein. *Diagnosis*.—See VEIN, INFLAMMATION OF. But thrombosis may be recognized by the hard cord-like feel of the vein affected, before inflammatory change has commenced, and by the œdema. *Prognosis*.—Varies most widely according to the extent and position of the clot, according to its first cause (*e.g.*, whether the mere ligature of a vein, or the entrance of putrid fluid into it), and according to the course the case takes while under observation. The danger of embolism exists to a slight extent in almost every case, and of pyæmia in such as show a tendency to local suppurations or as arise in the course of wounds. *Treatment*.—See VEINS, INFLAMMATION OF.

Warts.—See *Papillomata* (under head of *Tumors*).

Whitlow.—Erysipelatous inflammation of finger. Varies in extent from trivial but painful blush beside nail, to diffuse suppuration spreading up forearm and destroying tendons, phalanges, and even wrist-joint. *Causes*.—Local punctures, cuts and scratches, poisonous or otherwise. Predisposing causes are same as those of erysipelas, *quod vide*, *e.g.*, low state of health, diseased kidneys, epidemic and endemic influences. *Pathology*.—A cellulitis, at first, usually, of cellular tissue around ungual phalanx, but tending to spread to sheaths of tendons, to skin and subcutaneous tissues of back of hand, and even, as above stated, to phalangeal, and in the worst cases to metacarpal and still larger joints. May subside. Usually suppurates. Local and general effects precisely similar to those of cellulitis elsewhere. If a phalangeal joint be affected, or a tendon slough, there will probably be a stiff and contracted finger afterward. *Symptoms*.—Local redness, heat, throbbing, pain, tenderness, and swelling. Feverishness in slight cases, prostration in severe ones. Increased swelling and œdema when pus has formed. As incision is generally made early, and the part is exquisitely tender, fluctuation need not necessarily be felt for. *Diagnosis*.—Effects of a foreign body in the finger or hand may be mistaken for a simple whitlow. *Prognosis*.—Usually good as regards life, even in extensive cases extending up forearm. Bad or good locally according to extent to which tendons and joints are affected. *Treatment*.—Rest, local and general. Elevation and flexion; carry hand in sling just beneath chin. Pressure on brachial artery: patient can be taught to make it with the thumb of his sound hand. Poultices: frequent hot fomentations. After forty-eight hours, if symptoms are unrelieved, make two longitudinal incisions, one on each side of palmar surface of finger (of course, excepting those slight cases where this part remains unaffected). Give a purgative, *e.g.*, calomel, gr. x., afterward iron (tinct. ferri perchlor.,

π xv. ter d. s.). Regulate diet according to patient's condition and constitution. As a rule avoid meat. Appetite is generally bad. Phalanges may have to be excised or fingers amputated, in consequence of ill effects of old whitlow. During convalescence, if contraction threatens, place finger on a splint. Stiffness of hand may persist for a very long time, and be eventually removed by passive exercise, frictions, etc.

Wounds.—*Classification.*—(1) Incised, (2) lacerated, (3) contused, (4) punctured, (5) poisoned. Wounds are also either open or “subcutaneous.”

1. *Simple Incised.*—Its characters are clean edges, freedom from bruise or laceration and from poisonous matters, at least when first inflicted. 2. *Lacerated.*—Its edges are usually irregular, and frequently more or less contused. Comparatively small tendency to bleed. 3. *Contused.*—Has bruised edges; is usually also “lacerated.” 4. *Punctured.*—*E.g.*, a bayonet stab, generally narrow and deep. When caused by gunshot, its walls are bruised. 5. *Poisoned* wounds are such as snake-bites and dissection-wounds. In *subcutaneous* wounds the aperture in the skin is small compared to the incision beneath it, *e.g.*, in “tenotomy.”

Pathology.—*Process of repair, etc.* (compare with INFLAMMATION, *quod vide*).—When a simple incised wound is inflicted, nature first checks hemorrhage by closing the ends of the divided vessels in the same manner described under HEMORRHAGE, *i.e.*, by coagulation and contraction. At the same time there is usually a thin clot formed between the two surfaces of the wound. In consequence of the blood being unable to find its way through the divided vessels, there is congestion of the vessels about the wound; and the congestion of the neighboring parts, caused by the blood pressing through the nearest uninjured channels, is called “collateral fluxion.” In this way is produced the narrow line of redness around a fresh wound. The course of events after this is determined by whether the wound is to heal by the first intention (primary union), or by granulation. *First Intention.*—There is a great accumulation of white corpuscles, both inside and outside the blood-vessels near the wound. These leucocytes permeate the clot, if there be one, cause its liquefaction and absorption, and take its place. At the same time, the edges of the wound are themselves to some extent dissolved and replaced in the same manner. The leucocytes pass gradually through an oval into a spindle shape. These spindle-cells form, partly of themselves and partly of the intercellular liquid substance in which they lie, fibres of connective tissue, thus tying the two sides of the wound together. At the same time, new capillaries are formed, which bridge across the wound, allow blood once more to flow in its old course, and thus relieve the collateral fluxion. At this stage the scar grows redder, and its surrounding edges paler. The new capillaries are developed in two ways: (1) by loops which grow out from the vessels divided by the wound; (2) by certain rows of spindle-cells which develop into capillaries. At a later stage, the new fibrous “cicatricial” tissue con-

tracts, becomes "drier," i.e., less succulent, and, in contracting, obliterates many of the new capillaries. The cicatrix becomes, therefore, smaller and paler. Of course, after healing by the first intention, it is merely linear at first; but in a short time it may defy detection altogether. So rapidly does this disappearance take place in some cases that pathologists have described what they call "immediate union" or "primary adhesion," meaning, presumably, a perfectly simple cohesion like that of one piece of melted sealing-wax with another, and without further interstitial changes.

Granulation.—The process of healing when raw surfaces cannot be brought into apposition, and unfortunately also in some cases where they can. The microscopic anatomy of this process differs from that of "primary union," in that (1) the accumulation of leucocytes forms, on the surfaces of the wound, small elevations called granulations; (2) much of the waste tissues and superfluous corpuscles, which would be absorbed or profitably used in healing by the first intention, are, in the case of healing by granulation, cast off as pus; (3) the new capillaries cannot extend from one edge of the wound to the other, because they are too much separated either by distance or by some other obstruction, e.g., a foreign body or excessive clot; (4) a much larger production of epidermis is required to cover the surface of the wound. The resulting scar is larger, coarser, and much more prone to mischievous contraction. The new epidermis is developed from the most superficial layer of corpuscles in the granulations; but it appears concentrically from the epidermis at the edge of the wound, or else spreads from islets of old epidermis left by nature or placed by art on the area of the wound. (*See SKIN-GRAFTING.*) Pus-corpuscles are identical with leucocytes, but often contain several nuclei, indicating a tendency to multiply by division. Connective tissue, epidermis, epithelium, bone, and even nerve are reproduced perfectly (the last only to a limited extent). Muscles are only repaired by development of connective tissue. Lacerated and even contused wounds usually fail to heal by the first intention. The latter, especially, are liable to slough at the edges, and both tend to suppurate freely. Much depends on the conditions of each case, e.g., on situation of wound, on state of patient's viscera, and on treatment. Punctured wounds usually heal by first intention, except when also contused, as they are in gunshot wounds. Five methods of healing have been recognized, viz.: (1) primary adhesion; (2) first intention (or primary union); (3) granulation (or second intention); (4) union of two opposed surfaces, each covered with granulations (third intention); (5) scabbing. Method 4 combines, in succession, the processes of 3 and 2; 5 is probably similar to 3; only, such waste-products as there are, dry up into a scab, being of very small amount.

Healing by Organization of Clot is exactly similar in nature to healing by the first intention, in which, indeed, a thin clot generally does exist and becomes organized. A curious phenomenon is, that if any clot project

beyond the level of the general surface, the new epidermis cuts off the projecting part, healing only over the remainder. Organization of clot is beautifully seen after antiseptic osteotomy, and is well described by McEwen in his book on that subject. Lister rightly holds that the frequency of this process under antiseptic treatment is a strong proof of the soundness of his doctrines.

Consequences of a wound are (1) pain, (2) hemorrhage, (3) displacement, (4) loss of function, (5) shock. Pain of dividing skin, tense fascia, and bone comparatively great. (*See* HEMORRHAGE for separate notice.) Wounds by laceration, crushing, and cauterization usually cause little, often no hemorrhage. Displacement is usually a consequence of retraction. Not only muscles, but mere fibrous structures retract, by virtue of their elastic constituents. Loss of function varies in extent from stiffness, the result of tenderness, up to death. (*See* separate notice for SHOCK.) Retraction is greatest in the direction of the length of a limb, and in the muscles as compared with the skin, etc. Amount of pain varies with character, and even with occupation of patient. Of course, loss of function and displacement may amount to permanent paralysis and deformities. It is when the surgeon is about to inflict wounds (*i.e.*, operate) that he has most to consider the above-mentioned "consequences." In treating accidental wounds, the "consequences" are generally only too manifest.

Prognosis depends on (1) locality, (2) extent, (3) health of patient, especially state of kidneys and lungs, (4) age, (5) habits, (6) surroundings, (7) character, *i.e.*, whether incised or lacerated or poisoned or otherwise, (8) treatment. There are also other conditions less generally active, *e.g.*, race, which also may be secondary to such influences as habits. That wiry countrymen are much more hopeful subjects than fat, flabby townsmen, is an example of the action of "habits" and "health." Wounds of the upper do better than those of the lower extremity, especially as age advances. Generally, youth is a great advantage; but infants bear hemorrhage badly. There is no more unfavorable habit than habitual drinking.

Treatment.—Indications are: (1) to check hemorrhage, (2) to remove shock, if very severe, (3) to remove foreign bodies and to cleanse, (4) to adjust, (5) to dress, (6) splints, position, etc. (1 and 2 *vide* HEMORRHAGE and SHOCK.) 3. Use of hot water, cold water, sponges, camel's hair brushes, forceps, fingers, etc., according to peculiarities of each case. Gentleness is imperatively required. 4. In adjusting, avoid tension. Arrangement of joints, etc., so as to relax parts divided: *e.g.*, after accidental division of tendo Achillis, foot should be extended and leg flexed. 5. Dressings: prime objects are, firstly, to keep the divided parts in proper position; secondly, to prevent local and general complications which may interfere with healing and even endanger life. First object is fulfilled by use of sutures, strapping, pads, splints and position; of course, all this array of means is not used in every case. Second object requires precautions to be

taken against (1) exposure to draughts of cold air, (2) painful movements and positions, (3) septic influences. Changes of dressing should be quickly effected, and windows and doors closed during the process. Pain is prevented by careful adjustment of dressing, of splints, of position (especially by elevation and flexion), by use of swing-cradles, of cushions, etc. Opiates sometimes desirable, especially morphia subcutaneously. Septic influences: their avoidance can probably be thoroughly secured in only one way, viz., by preventing the access of living germs to the wound. But much good may be done by removing, as fast as they collect, all discharges which can form a nidus for these germs. The former end is most surely secured by the antiseptic system rigorously applied. The latter aim can be more or less successfully attained by several means. Lister's antiseptic system, though indirectly (*e.g.*, by expediting cure) economical, is directly expensive, especially when the surgeon does not habitually employ it, and in the case of very large operation-wounds, *e.g.*, amputations of the thigh. In these cases immense quantities of expensive dressings have to be changed, often daily, because of the great discharge. As, also, no antiseptic system can provide against all the dangers of wounds, it is not surprising that a surgeon, after losing a case or two dressed with thorough antiseptic precautions, should be disposed to return to more familiar methods, upon which, in past times, his fortune may have smiled more favorably. In the case of moderate-sized wounds, Lister's antiseptic system is simply perfect, and almost proof against ordinary carelessness, ignorance, and stupidity. On the other hand, "open treatment" and oakum dressings are free from the objections which may be urged against Lister's antiseptic system, in the case of great amputations. They are very cheap and simple. They doubtless both act by gaining the second end above mentioned, viz., the removal of discharge from the wound as fast as it forms, and, consequently, by depriving the septic germs of material to work upon.

Pasteur's experiments prove germs to be too universal for the oakum dressings to act otherwise, as no precautions, such as the carbolic spray, are usually taken whilst changing them. Oakum dressings have these superiorities over open treatment, they protect the wound from cold draughts, they destroy offensive smells, keeping the general air of the ward pure, and they *actively* drain the wound by their power of capillary attraction. What I saw when house-surgeon under Gamgee at Birmingham, convinced me that no system of wound-dressing could be complete without some provision for gentle and elastic compression. This, Gamgee used to secure with cotton-wool; but as soon as Martin's bandages became known in England, I took to completely covering with them most of my operation-wounds which were dressed antiseptically, and some which were not. I have never seen a stump which healed more rapidly, or looked better when healed, than one which had no dressing whatever but a rub-

ber bandage over it, and a pad of oakum to drain into. But in this particular instance it was not practicable to dress antiseptically. The mode of dressing used lately by Esmarch, with a success perhaps unparalleled, not only as regards general results, but as regards individual cases, may be described as an instance of the successful combination of antisepticism with gentle compression. Next the wound are placed pads soaked in iodoform and absolute alcohol (ten per cent.), then an iodoformed bandage, then a large pillow of jute and gauze, then a moist bandage, and lastly an elastic bandage. Even after amputation of the thigh, this dressing seldom needs a single renewal. Healing takes place by the first intention, not even a hole for the drainage-tube being left; for Esmarch uses absorbable tubes of decalcified bone. It is most important before applying such dressings to check all oozing of blood. Recurrent hemorrhage need scarcely be feared at all. The under-bandages should be put on as lightly as possible, and the elastic bandage should be applied with great care and gentleness. Iodoform, insufflated, makes a capital dressing for many wounds, *e.g.*, lithotomy, perineal section, operations near the mouth, anus, urethra, and the like. Other modes of local treatment, comparatively rarely employed, are cotton-wool dressing, irrigation, and immersion. Poultices of linseed, or of bread, are still in common use, and are certainly soft, moist, hot, and comfortable, and therefore possibly act favorably on any local inflammations that may be near the wound. Oakum (including the kinds termed "tenax," "stipium," etc.) is applied like a poultice. Like every other antiseptic substance, it is somewhat irritating; therefore a narrow strip of protective should be placed next the edges of the wound. The not uncommon practice of using lint soaked in carbolic oil as a protective is unreasonable; for the lint obstructs the absorptive power of the oakum, whilst the carbolic acid is as irritating as the tar in the oakum. Rarely should the wound, excepting when fresh, be syringed or washed—it cannot be kept too dry. (*Vide* ANTISEPTIC TREATMENT.) Read Gamgee on the "Treatment of Wounds," an authority on oakum and cotton-wool dressings, but unjust to Lister and his methods. Without antiseptic treatment, grand statistical results have been obtained by various surgeons; but, considering how many things affect the success of surgical practice, *e.g.*, experience, observation, judgment, resource, manual dexterity, pluck, and, perhaps above all, patience and enthusiasm, not to mention endemic and epidemic influences, it is certain that *mere* statistics prove little for or against any system of dressing wounds, unless those statistics extend over long periods of time, different localities, and immense numbers of cases. And, even then, they should not be permitted to overrule other evidence such as presents itself to the surgeon who, in London at all events, watches any small series of wounds in detail, of which some are treated antiseptically and others not. For, even the statistics of an honest observer have not really the force of mathematical certainty. Be-

hind them is always the human heart, whose truth is often noble, but never mathematical.

These remarks are not uncalled for. Repeatedly, of late, have the student and practitioner been invited to deprive themselves and their patients of the safeguards offered by modern science, on the strength of comparison between the statistics of *two places only*. Such a comparison no more furnishes an argument against Listerism than the security of those Acadian farmers, who had "neither locks to their doors nor bars to their windows," condemns the use of the Metropolitan Police.

Drainage.—A necessity for all wounds where there is likelihood of supuration or serous discharge. Effected by drainage-tubes of rubber, of decalcified bone (or, less frequently, of twisted wire), by strands of catgut or horse-hair, or by strips of gutta-percha. Desirable to consider how to favor drainage in arranging direction of cuts and position of wound. A drainage-tube is a foreign body which may itself cause pain and irritation. As a rule, it should be gently removed, squeezed, and washed every dressing. It is useless to try to squirt carbolic lotion through seven or eight inches of a drainage-tube riddled with holes and lying in a wound. Before removing to clean, tie a piece of silk to it. Leave this in the wound, to afterward use as guide for replacement. Be very gentle.

Very rarely do any severe wounds of the soft parts alone require *amputation*. But they may also do so when (1) even recovery would only be with so much deformity or loss of function that the part would be worse than useless; or (2) when the injury is so extensive and serious that gangrene and death are threatened. Injuries complicated with division of large arteries, with much contusion, and in the lower extremities of adult, and, much more, of aged people, are of this nature. No verbal rules can do instead of experience in deciding in such cases. Here even the master-surgeon steers with perplexity between Scylla and Charybdis.

APPENDIX.

Microscopic Organism (Vegetable).—Table of the chief diseases in which they have been found :

DISEASE.	ORGANISM.
Favus.	Achorion Schönleini.
Tinea tonsurans.	Trichophyton tonsurans.
Sycosis.	Microsporon mentagrophytes.
Pityriasis versicolor.	Microsporon furfurans.
Thrush.	Oidium albicans.
Concretions in the mouth, salivary ducts, and urinary bladder (including all carbonate of lime calculi).	Leptothrix.
Caries of the teeth.	Leptothrix.
Malignant pustule. Anthrax (of animals).	Bacillus anthracis.
Malarious affections.	Bacillus malarie.
Typhoid.	Bacillus typhi abdominalis.
Typhus.	Bacillus typhi exanthematici.
Leprosy.	Bacillus leprosus.
The Septic processes: septicæmia, pyæmia, progressive suppurations, hospital gangrene, diphtheria, puerperal fever.	Cocco-bacteria (genus — "microsporina").
Mycosis septica (Orth)—a disease of new-born infants.	Cocco-bacteria.
Mycosis of the navel.	Cocco-bacteria.
Acute exanthemata: variola-vaccina, scarlatina, measles.	Cocco-bacteria (genus—"monadina" of Klebs).
Inflammatory processes: endocarditis, certain "rheumatic" or "fibroid" affections of the liver and kidney, which "lead more especially to formation of connective tissue, and not to suppuration."	Cocco-bacteria (genus—"monadina").
Croupous pneumonia: erysipelas (allied to croupous pneumonia.—Klebs).	Cocco-bacteria (genus—"monadina").
"Certain puerperal processes."	Cocco-bacteria (genus—"monadina").
Mumps.	Cocco-bacteria (genus—"monadina").
Tuberculosis.	Cocco-bacteria (variety, "helicomonas" of Klebs).
Syphilis.	Cocco-bacteria (variety, "helicomonas")
Glanders.	

Some of the diseases in which, though not hitherto observed, it is highly probable that microscopic organisms will be found are cholera, yellow fever, and madura-foot.

METHODS OF STUDYING THESE ORGANISMS.—High power usually required. Many micrococci look small even when magnified 700 diameters. Most, but not all, resist the action of acids and alkalies, while animal tissues do not. Staining fluids: hæmatoxylin and aniline dyes, especially the latter. Special illumination apparatus: Abbe's.¹ Examination may be made of either (1) the diseased animal tissues, (2) the soil, water, or air in which some of the organisms unquestionably flourish, (3) cultivation-fluids and solids, or of (4) the tissues of animals artificially inoculated. When cultivation-fluids are used or animals inoculated, conclusiveness may be given to the experiments by separating the microscopic organisms from the liquids in which they lie. This is done in two ways—(1) Chauveau's, who used the sediment deposited by vaccine; (2) filtration through porous clay (Klebs); or through gypsum (Pasteur). Further, though individual animals have very similar susceptibilities to these organisms, yet different species are often very unequal in this respect. Thus the living animal body can be sometimes used as a filter, to separate even one kind of minute organism from another (Koch), and it is, of course, easy to separate any organism which infects the body generally from one which infects only locally.

Botanical Position.—The microscopic organisms, not animal, which are found in animal bodies in infective diseases all belong to the sub-class Thallogenæ. In the order hyphomycetæ are achorion, trichophyton, and oïdium. In the order algæ is leptothrix. In the order schizomycetæ may be distinguished two widely different forms, viz., bacilli and cocco-bacteria. The bacilli have been respectively named after the diseases in which they occur. (*See above.*) Cocco-bacteria are divided again into microsporina and monadina.

Morphology.—In bodies so minute there cannot be great variety in shape. The chief forms are delicate rods and granules. The former are sometimes jointed, and the latter are frequently arranged in a chain-like series. When a number of bacilli are joined end to end a thread-like appearance results. Masses of organisms occur termed zoöglœa. The size varies somewhat according to the species.

Parts they Inhabit.—Chiefly the blood-vessels. But those which are the probable causes of local diseases are found only locally. The contents and, still more, the walls of abscesses. Ogston says they are always to be found in acute abscesses. Pyæmic deposits. The small metastatic deposits of pyæmia, puerperal fever, etc., consist of bacteria; and the discovery of this (by Rindfleisch) was "the first communication regarding the occurrence of bacteria in the organs of those who have died of traumatic infective diseases" (Koch). Granulations. Joint-surfaces. Serous membranes. Diphtheritic exudations. Pus. Renal glomeruli and tubuli. In-

¹ Made by Zeiss.

deed, every organ or tissue where the blood can penetrate appears to be liable to invasion by some septic organism or another. The monadina are actively movable, and penetrate the cells, causing considerable swelling of them.

HOW DO THE ORGANISMS ENTER THE BODY, AND WHENCE DO THEY COME?—They do not exist normally in the healthy body. The best observers, those who have added most positive information to our knowledge of minute anatomy, have been quite unable to find them herein. The same class are practically unanimous in rejecting the idea of spontaneous generation. Many of the organisms enter seldom or never except through wounds or slight abrasions, scratches or punctures. Others readily cling to and grow into the cells of mucous membranes. Possibly some may have the power of piercing skin, or at all events the skin of a person not in perfect health. The organisms sometimes pass from one animal to another by contact with secretions or excretions, or, in a few instances perhaps, through the air. Some of the organisms exist constantly in certain localities in the air, the water, or the soil. Some cling to certain buildings, perhaps to the walls, floors, ceilings, or furniture.

Do the Microscopic Organisms cause the Diseases, or are they merely accidental concomitants, "parasites of the diseases," so to speak?—To answer the first part of this question positively in the affirmative, it would be necessary to demonstrate that (1) the organisms exist in every case of each disease; (2) that they exist also in sufficient numbers and in the proper localities to cause the phenomena of the disease; (3) that when transferred successfully and purely from one animal body to another of the same species they reproduce the disease. Moreover, it would be very desirable to show that the organisms of different diseases have themselves different morphological peculiarities. The difficulties of fulfilling all these requirements are immense; but they have been overcome in the case of a sufficient number of distinct diseases to encourage hope that ultimate success will attend the investigation of the others. Finally, it should be noticed that Koch, having produced pyæmia in mice, found that the micrococci adhered to the red corpuscles, and that the red corpuscles thus affected tended to crowd together in the capillaries. The ultimate result of this was thrombosis. This, perhaps, explains the occurrence of "metastatic" abscesses in pyæmia.

Many substances are fatal to every kind of bacteria. Such are carbolic acid, oil of eucalyptus, salicylic acid, and iodoform. There are strong reasons for believing that certain substances are especially destructive to particular species, *e.g.*, quinine to *bacillus malariae*. Koch says that "Eidam came to the conclusion that different forms of bacteria require different conditions of nutriment, and that they behave differently toward physical and chemical influences." But it is not too much to hope that the marvellous resources of organic chemistry may soon prove to us that in

science, as in law, there is "no wrong without a remedy." The discoveries of Pasteur, Chauveau, and Toussaint suggest the possibility of applying the principle of inoculation as a prophylactic against many, if not all, specific organisms. Pasteur has shown that by the action of heat and oxygen, organisms, deadly to certain animals, may be so modified that, while preserving the power of infection, they can infect only mildly, and yet protect the inoculated animal against future infection by more active organisms of the same species.

In constructing the above, unfortunately, very imperfect account of the present state of knowledge concerning a subject of absorbing interest and vast importance, I have been chiefly indebted to Koch, on the "Etiology of Traumatic Infective Diseases," translated for the New Sydenham Society by Cheyne, and to the addresses of Pasteur and Klebs at the International Congress, 1881. In these may be found the names of the numerous workers who have discovered what is at present known of the subject.

Charcot's Joint Disease.—Preceded by the "lightning pains," characteristic of *tabes dorsalis* or locomotor ataxy. The limb near the affected joint sometimes swells quickly and extensively, after some time returning again to its normal size. Spontaneous dislocations. Fractures caused by gentle movements. Accompanying signs of locomotor ataxy, *e.g.*, more or less inco-ordination of movements and loss of muscular sense. "The very rapid and extreme wearing away of the articular extremities of the bones is the principal character which, from an anatomico-pathological point of view, distinguishes the arthropathies of ataxia from common rheumatic arthritis (*arthrite sèche*)." There is also little or no formation of osteophytes. Excellent model and specimens in St. Thomas's Hospital Museum.

Osteotomy.—A term now practically confined to the division of bone for deformity, with, at most, the removal of a wedge-shaped piece.

Instruments.—Saws, osteotomes, and chisels. Saws are very narrow, and either blades or chains. Osteotomes resemble chisels, but they are bevelled on both surfaces, while the chisel proper is bevelled only on one. The temper of the steel and angle of the bevel are of high importance in the case of osteotomes and chisels. Improper instruments would easily cause fatal results, or, at all events, splintering of bone, great shock, perhaps failure to obtain the object aimed at, and occasionally a piece of the chisel left in the bone. A proper osteotome can be driven by a mallet through the femur of an ox without splintering the latter or damaging itself. Never use a hammer. Osteotomes are used for simple division. Chisels are entirely unfit for this purpose, except in the case of very small bones, and should be reserved for removing wedge-shaped pieces. Place limb on a sand-pillow (moistened just before operation and covered with waterproof).

Management of the Saw.—Adams' is commonly used. It has a shank and is usually pointed. The soft structures are incised with a long tenotomy-knife down to the bone, and the periosteum is cut with the same knife. The orifice of the incision is usually only half an inch long, or even less. The knife being withdrawn, the saw is passed into the tunnel just prepared for it and its cutting edge turned to the bone. The saw is generally withdrawn when two-thirds of the bone are divided, then the remainder is broken.

Use of the Osteotome.—Insert a scalpel right down to the bone at the place to be divided. Wait two or three seconds, to give the muscles penetrated time to quiet, then complete incision. Size of incision should at first be large enough to admit finger. As operator gains experience he will venture safely to dispense with this and pass in the osteotome alone. Incise in line with the bone to be divided. Rotate osteotome when it reaches the bone. Do this lightly so as not to damage the periosteum. Hold handle of osteotome firmly in left hand, with ulnar border of that hand against the skin of the limb. The direction and management of the instrument vary with the site of operation. As a rule cut away from large arteries and divide the hardest part of the bone first. When removing the osteotome, keep the thumb and first two fingers closed upon it, and gradually work it out by alternate contractions and relaxations of the other fingers. When two-thirds of the bone are divided the rest can usually be broken.

In using the *chisel* turn the bevelled side toward the wedge. If the wedge is to be thick, cut a thin wedge first and chip away other pieces from each side of the gap.

Never use either osteotome or chisel as a lever to break bone. Keep saws, osteotomes, and chisels bright and free from rust, or they clean themselves in the bone. Check all hemorrhage before dressing. When both limbs are osteotomized, the first wound can be compressed with an antiseptic sponge and gauze bandage while the other is being operated on. Operate strictly antiseptically. Cut away any projecting cellular tissue, as it delays cicatrization. Use no drainage-tube unless some accidental circumstance occurring during the operation leads you to expect supuration. Healing usually takes place by organization of blood-clot (see WOUNDS), but by granulation where cellular tissue is exposed uncovered by blood.

After-treatment.—Take temperature morning and evening. A temperature of 101° demands inquiry. It may arise from some quite accidental complication independent of the operation, or from a tight bandage, or from an accidental sore-throat, or trivial ailment. If it cannot be thus accounted for, expose and examine the wound. After osteotomy of the lower limbs, unless the divided bone is supported in a firm plaster case, some contrivance is useful to facilitate defecation, e.g., a mattress with a

movable central piece, or my stretcher. Immediately after the bone has been divided it should at once be put into the position ultimately required. After osteotomy of the limbs, attend during the first twenty-four and forty-eight hours very carefully to the state of the toes or fingers, as the case may be. They should be free from numbness and obstructed circulation. Permeation of discharge should be looked for from day to day, though it seldom occurs after the first two days. So long as it is absent the dressing does not need removal.

GENU-VALGUM, OSTEOTOMY FOR.—Place of Incision for McEwen's Operation.—On the inner side of the limb, at a point where the two following lines bisect one another: a line drawn a finger's breadth above the level of the upper border of the external condyle, and a line drawn parallel to and half-an-inch in front of the tendon of the adductor magnus. *Management of Osteotome.*—To begin with, place it against posterior part of inner border of femur and cut from behind, forward and outward, away from femoral artery. Remember that, just above the condyles, the outer border of the femur is thicker than the inner.

Place of Incision in Chiene's Operation.—"An incision two to three inches in length is made over the tubercle" (that of the adductor magnus) "and is carried upward for a sufficient distance."

The Wedge.—"The long axis of the wedge runs downward and outward toward the notch between the condyles."

Grasp the tibia at its lower extremity, and by pressure *inward* bend the neck of the bone attaching the condyle to the femur. (See *Edinburgh Medical Journal*, 1878.)

Osston's Operation for Genu-valgum.—If the genu-valgum be severe, operate with the knee bent, otherwise with the knee extended. A tenotomy-knife is inserted at a point as far back as the level of the internal condyloid ridge, and about four inches above the most prominent point of the internal condyle. It is passed downward, outward, and forward, to the notch between the two condyles, until the point can be felt projecting in front of that notch. Before withdrawing it, the periosteum and cartilage are incised. An Adams' saw is now passed in, and the internal condyle sawn two-thirds off. Now, extending the limb (if it has been flexed hitherto), and using the tibia as a lever, with the operator's knee as a fulcrum, the limb should be bent inward till the internal condyle cracks off and slips upward. With splints and pads place and keep the limb straight till union has taken place. Commence passive motion about the end of the third week. Of course, use strict antiseptic treatment. (See *Edinburgh Medical Journal*, March, 1877.)

Dressings, etc., of Osteotomies for Genu-valgum.—See general remarks above. Well and judiciously padded box-splints are commonly used. But, as few or no changes of dressing are usually required, the limb can be once for all fixed in a moulded case of plaster-of-Paris or similar material.

OSTEOTOMY FOR ANKYLOSIS OF HIP IN A BAD POSITION.—If there be a good neck to the femur, in other words, if the great trochanter appear to be set far enough away from the os innominatum, divide the neck of the femur. Otherwise operate below the great trochanter.

Division of Neck of Femur with an Osteotome.—Bisect a line between the ant. sup. spine of ilium and the ant. sup. angle of the great trochanter. At the point thus found pass in a sharp-pointed steel director backward, inward, and a little downward till it stops at the neck of the femur. Along this director pass a scalpel down to the bone; first cut toward the trochanter, then, rotating the director and reinserting the scalpel, cut toward the ant. sup. spine. The incision should just admit the forefinger. Do not withdraw the director till the osteotome is inserted. Rotate osteotome so as to bring it across the neck of the femur, cut nearly through and break the rest.

Division of Neck of Femur with Saw (Adams' operation).—W. Adams passes in a long tenotomy knife "a little above the top of the great trochanter," and straight down to the neck of the femur. He divides the muscles and "opens the capsular ligament freely." A narrow-bladed saw is passed into the wound and across the front of the neck of the femur, with its flat side against the bone. It is now turned on edge and the division accomplished.

Extension by weight, and without any splint, after osteotomy of the neck of the femur, is to be preferred. Sometimes a second weight pulling outward from the upper third of the thigh adds to comfort. When it is used a felt splint should be moulded to the inner side of the thigh to distribute the pressure. Keep the foot perpendicular, or even a little inverted.

REMOVAL OF WEDGE OF BONE FOR CURVATURE OF TIBIA.—Use a chisel. Make a single incision, the loose skin will permit this to be moved up and down. The wedge need not go more than three-fourths through the bone. Supposing it to be made at the apex of the angle of curvature, its upper surface should be at right angles to the border of the tibia above, and its lower surface at right angles to the border of the tibia below. When adjusting the bony surfaces avoid nipping muscle. The fibula can either be broken or divided through a separate incision of the soft parts. See general directions above.

Every commencing osteotomist should study McEwen's book.

Ovaries.¹—Chief affections: inflammation, acute and chronic; cystic disease; solid tumors.

OVARY, ACUTE INFLAMMATION OF.—*Causes.*—Gonorrhœa, sexual excesses, exposure to cold, etc. *Symptoms.*—Severe pains in one or both iliac

¹ Contributed by Mr. Alban Doran, Assistant Surgeon to the Samaritan Hospital.

fossæ, radiating to loins. By pressing the left hand on the iliac fossa, and introducing two fingers of the right hand into the vagina, pressing upward, the ovary may be felt between the right and left-hand finger—it will be distinctly swollen, and very tender. *Treatment*.—Absolute rest. Leeches and poulticing to iliac fossa.

OVARY, CHRONIC INFLAMMATION OF.—Very insidious, and often begins gradually; not always preceded by acute symptoms, may end in cirrhotic changes; and is sometimes associated with persistent dysmenorrhœa so intolerable that both ovaries, when thus affected, have been of late years frequently removed, without always relieving the symptoms. Fixed pain in iliac fossæ, and detection of swollen ovary the chief signs of the disease, local complications infinite. *Treatment*.—Blisters, rest during period; observe closely the condition of surrounding viscera, and treat accordingly.

OVARY, CYSTIC DISEASE OF.—Pathology not yet absolutely settled. Cysts that are evidently developed from enlargement and non-rupture of the Graafian vesicles seldom appear to form a large tumor. Commonest form is the *multilocular cyst*, originating in morbid changes in the stroma and its vessels, and containing glairy fluid more or less colored; contents may be partly solid. Another type is the *parovarian cyst*, unilocular or nearly so, and containing clear, watery, transparent fluid. A third is multilocular, and contains exuberant papillary growths in its cavities. This also holds clear fluid, and like the second kind, is believed to be developed from vestigial relics of the Wolffian body. Lastly come *dermoid cysts*, containing hair, sebaceous matter, teeth, bone, and walls lined with skin, bearing complete glandular structures.

Symptoms.—Gradual distention of abdomen; a prominent fluctuating tumor occupies the hypogastric, umbilical, and often epigastric regions of the abdomen, extending more or less into the flanks. May bulge into Douglas's pouch, where it can be felt from the vagina, or may draw uterus high up; then it cannot be detected by vaginal examination.

Diagnosis.—From *ascites*: as the patient lies supine, the bulging and dullness is in the front of the abdomen in cystic ovarian disease, in the flanks in ascites; in the latter resonance is altered by change of position, but not in the case of ovarian cyst. From *cystic kidney*: in this disease the dullness is very marked in one flank, and seldom extends far across the median line to the opposite side of the abdomen. It may push the colon forward, which may be detected, as a cord, or a tube resonant on percussion, in front of it. From *hydatid cysts*: when in the liver, there is resonance in the lower part of the abdomen, but abnormal dullness to the right side above; the fluctuating cysts project from the solid liver. When in the great omentum, the abdomen becomes distended, but not prominent anteriorly; the small fluctuating cysts can be detected separately, feeling on palpation like potatoes in a sack. In all cases of hydatid disease tap-

ping will procure the characteristic fluid. From *fibro-cystic uterine tumors*: chiefly by introducing the sound into the uterus. If it move very intimately with the tumor, that growth may be uterine, or else an ovarian cyst with very close connections with the uterus. The diagnosis from soft solid growths must depend on careful palpation.

Complications.—*Inflammation* of the cyst-wall, indicated by sudden attacks of abdominal pain, and generally causing adhesions to abdominal walls, omentum, or viscera. *Suppuration* of cyst, indicated by rigors. *Strangulation* of cyst by twisting on its own pedicle, so as to obstruct its nutrient vessels. If partial, this may cause diminution in size of cyst from atrophy; if complete, the cyst will slough, with fatal results if not relieved. *Rupture* of cyst, from violence or from degeneration of its walls; the tumor gets suddenly smaller and less defined, with more or less severe abdominal symptoms.

Treatment.—If the patient be very weak, and suffer from extreme distention, the tumor may be tapped, and the operation deferred for a few weeks. It is always right to operate, and as early as possible, except in cases of cysts that appear to contain solid malignant growths, and are at the same time suspected of being intimately adherent to other structures.

OVARIOTOMY.—Place the patient on her back, with shoulders slightly elevated. Make an incision a few inches long over the linea alba, beginning about an inch below the umbilicus. Bleeding vessels are best secured till the end of the operation by self-holding forceps, which check hemorrhage permanently. When the peritoneum is divided and the cyst exposed, plunge the special trochar into the tumor, withdrawing fluid contents through canula into a pail or other receptacle under the table. Break down solid contents of cyst with hand introduced into the tumor. If there be adhesions to parietal peritoneum, break them down with hand, and secure any bleeding vessels; adherent omentum must be cut away and the vessels secured; pelvic and visceral adhesions require great care in separation. Then place two or three clean sponges into pelvic cavity and above tumor. Raise the flaccid tumor out of the wound; the pedicle must then be transfixed (avoiding large veins) by a stout needle armed with two stout silk threads. The ends of each thread on *one* side of the pedicle must be crossed over each other, then tie the free ends round the opposite sides of the pedicle. If the outer border of the pedicle be very tense, secure the ovarian vessels separately, else they will slip. The pedicle, if very broad, may require a second transfixion, the threads must then be crossed again on one side as before. Next cut the tumor away and drop the pedicle. Search for the other ovary, and remove it, if it be distinctly cystic. Then take out the sponges, and see if they show that there has been fresh hemorrhage from separated adhesions; use fresh sponges to mop up any cystic fluid or clots that may have escaped into the cavity of

the peritoneum. Remove all forceps and sponges, count them, sew up abdominal wound with silk thread or silkworm gut threaded to a needle at each end, introducing the needles from the peritoneal side, and avoiding the recti muscles. Some operators use the cautery instead of the ligature for securing the pedicle; the clamp is almost entirely discarded. Lister's precautions valuable in this operation. In cases of strong adhesions, with exudation from peritoneum after they have been separated, pass a glass drainage-tube into Douglas's pouch through the abdominal wound.

OVARY, SOLID TUMORS OF THE.—Fibroma or fibromyoma sometimes observed in the ovary. Its occurrence there can be understood now that the strong resemblance of the spindle-cells in the stroma to uterine tissue is well recognized. Sarcomata and carcinomata from solid tumors distinguished from uterine growth by their being free from the uterus, as the sound will detect. They are nearly always accompanied by ascites: the health rapidly deteriorates. *Treatment.*—Fibromata and even malignant tumors may be removed by ovariectomy. Abdominal wound must be large, often extending above umbilicus; the pedicle is generally very thick and vascular. Never operate on malignant growths when there is much ascites with large cells in the fluid, œdema of the abdominal walls, evidence of strong adhesions, or marked cachexia.

Scarlatina not unfrequently complicates the after-course of operations on children. It appears to differ little from ordinary scarlatina, provided only nature or antiseptic treatment guards the little patient from coincident septicæmia. If anything, it is less dangerous than ordinary scarlatina. The subject has been extensively treated of late years in the journals and hospital reports, and at the Societies,¹ by Messrs. Marsh, Howse, Owen, etc.

Hereditary Syphilis (Congenital Syphilis).—In hereditary syphilis the fœtus either (1) dies early in utero, abortion taking place, or (2) is born alive prematurely, or (3) is born dead at full term, or (4) is born apparently healthy, the disease manifesting itself afterward. The more recent the syphilis in the parents, the greater the danger to the infant. In the case of syphilis of the placenta the fetal portion is much more commonly affected than the maternal. Gummata are found therein in the form of yellowish white tubercles. Hennig showed their intimate relation to the vessels. The obliteration of the vessels, if extreme, interferes with aëration of the fetal blood, thus producing death of the fœtus (Fränkel, quoted by Bäumlér). Infants with congenital syphilis are generally in appearance old, small, and shrivelled. They have *snuffles*, i.e., nasal catarrh, and *eruptions*. These, usually papular or roseolar, are sometimes bullæ, but rarely pustular, and very rarely vesicular. Bullæ (*pemphigus neonatorum* syphi-

¹ Also at the International Congress, London, 1881.

iticus) occur especially on palms and soles. This is a point in diagnosis. *Mucous tubercles* at corners of mouth and eyes, in flexure of limbs, on neck and behind ears. Characteristic eruptions are very copper-colored. Stomatitis. Mucous tubercles in mouth, throat, and larynx. Iritis sometimes, especially about fifth month. Deafness occasionally. *Osteo-chondritis*.—Important diagnostically, because it is often the only pathognomonic symptom. It is caused by syphilis exclusively. Affects chiefly epiphyses of long bones—femur, tibia, humerus, etc., clavicle, sternum, ribs. Epiphyseal cartilages swell, and can be felt projecting as would a ring round the bone. The swelling is usually smooth. Little or no pain or interference with movement. Occasionally causes ulceration and necrosis. Is commonly symmetrical. Leaves no ill effects if resolution takes place quickly. Otherwise may permanently affect growth of limb. Period of its occurrence, usually at birth or during first month. For a very full account read Bumsted and Taylor. But Wegner, of Berlin, first described it. *Spleen* is enlarged in at least fifty per cent. of cases, and often accompanied by hypertrophy of liver (Gee). *Later Effects*.—About period of second dentition, or about puberty (in girls especially), appear interstitial keratitis, serpiginous ulcerations, eruptions almost rupial in character, ulcerations of throat and hard palate, nodes, affections of viscera; and certain nervous affections, especially epilepsy, chorea, and even paralyses (Hughlings Jackson). The characteristic signs present at this period, besides the manifestations just mentioned, are certain relics of infantile syphilis, viz., flattened nose, projecting forehead, dull-colored skin, lines about the corners of the mouth, and "*Hutchinson's teeth*." The peculiarities of the last are due to stomatitis in infancy; therefore, if the syphilitic infant escape stomatitis, it will escape teeth deformity. The upper front permanent teeth are the most peculiar, the central incisors especially. These converge toward each other, are dirty looking, imperfectly covered with enamel, often small and short, and are either notched or pegged on their cutting edges. *Prognosis*.—Depends mainly on the severity of the symptoms. The worst cases usually die. But most infants and adolescents (especially the former) with inherited syphilis are strikingly amenable to treatment. *Treatment* is to be conducted on exactly the same principles as that of acquired syphilis, *q.v.* Children readily take hyd. c. creta, or respond to mercurial inunction. Always add iodide of potassium when bone is affected, and in the later manifestations.

Vaccino-Syphilis.—The chief practical points connected with this subject are that (1) the child from whom the lymph is taken should not be less than four months old; (2) the lymph first drawn from the pustule should be used; (3) it should be clear, entirely free from any perceptible admixture of pus or blood; and, of course, (4) the appearance and history of the child and its parents should be unimpeachable. But Keber, of Dantzig, has shown that even clear vaccine lymph contains pus and blood-

corpuscles, and in a small proportion of infants (5 in 158, Diday) congenital syphilis does not show itself till later even than the fourth month. Lymph from the calf is much less likely (according to some certain) to be free from any taint of syphilis. When syphilis is communicated by vaccination the poek runs its normal course, and no sign of specific infection appears till about the twenty-eighth day. Refer to Hutchinson's "Illustrations of Clinical Surgery," fasc. vi. ; and to Hugh Thompson, *Glasgow Medical Journal*, 1879.

Toothache ¹ is a pain arising from a lesion, either within or about the region of a tooth. *Causes*.—Caries ; irritation of the pulp ; acute and chronic inflammations of the tooth-pulp ; acute and chronic periodontitis ; exostosis and necrosis. *Symptoms*.—When toothache arises from caries, the pain is of a dull aching character, and is *treated* by the application of creosote, morphia, mastiche, and various anodynes, which are inserted into the cavity of the affected tooth, and then in a few days the carious matter excavated, and metallic fillings placed in the tooth. In irritation of the pulp the pain is the same as in the above affection, but is more prolonged, and is treated in the same manner. **TOOTHACHE FROM ACUTE INFLAMMATION OF THE PULP** is recognized by the pain, which is at first confined to the affected tooth, being of a dull aching character, which soon becomes more intense and lancinating, and appears to spread over entire side of head and face. Disease is almost always accompanied by caries, and may run on to suppuration and gangrene of the pulp. *Treatment*.—In children the extraction of the offending tooth is generally called for ; but, in adults, either application of arsenious acid, $\frac{1}{10}$ of a grain, may be used to hasten the destruction of the diseased pulp, or the constant and renewed applications of carbolic acid on pellets of cotton-wool may attain the desired end. The tooth may then be afterward filled.

CHRONIC INFLAMMATION is generally the sequel of acute inflammation of the tooth-pulp, and, if the occurrence is frequent, the tooth had better be extracted. The pain is of a dull and gnawing kind.

ACUTE PERIODONTITIS may arise from a blow, or be the sequel of acute inflammation of the pulp, or may arise from constitutional causes, such as rheumatism or scrofula. Pain commences with a feeling of uneasiness, which increases to an aching, combined with great tenderness on pressure. The tooth is felt long, neighboring teeth become involved, and the inflammation spreads to the palate and cheek, which is swollen and œdematous. Suppuration takes place, pus is formed, and an abscess may burst at any point, either external or internal to the dental arch. *Treatment*.—If the tooth is far involved in caries, extraction of the offender is the best remedy. When it is desirable that the tooth should be retained, applications of

¹ Contributed by Mr. I. Lyons, Assistant Dental Surgeon to St. Bartholomew's Hospital.

poultices or poppy fomentations are of great benefit, but must be applied inside the mouth only, and about the region of the affected tooth ; or local bleeding by leeches, and free incisions, and the prescribing of such constitutional remedies as may be indicated.

CHRONIC PERIOSTEAL INFLAMMATION is generally the sequel of the above disease. The character of pain is the same but more modified, and the treatment is nearly always extraction of the tooth,

DENTAL EXOSTOSIS is an outgrowth of osseous tissue from the surface of the cementum of the fang. The usual cause of it is chronic periodontitis. The pain is of a neuralgic character. Extraction is the only available remedy.

NECROSIS arises when the fang of a tooth becomes denuded of its periosteum, and its most frequent cause is acute periodontitis.

Tuberculosis.—An excellent account, by Klein, of the present state of knowledge concerning the infectious nature of tuberculosis is to be found in the *Practitioner* for August, 1881. The chief practical points are that (1) the possibility of infecting cattle, pigs, and sheep by feeding with the meat, and even with the milk, of tuberculous animals has been proved ; that (2) the materies morbi is present in gray or caseous tubercle, and is not present in caseous matter which has not been derived from real tubercle originally. The first point is made more important by the evidence offered by Creighton of the transmissibility of bovine tuberculosis to man by means of milk. All this lends probability to statements which have over and over again been made of the infectiousness of phthisis. Klebs and Schüller have observed that micrococci are constant in human tubercular matter.

NOTES ON OPHTHALMIC SURGERY,

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- CATARACT**—Central, Cortical, Lamellar, Capsular, Traumatic, Secondary. Operations. Spectacles.
- CHOROID**—Hyperæmia, Choroiditis, Sclerotico-Choroiditis Posterior, Tubercle, Tumors, Bone Formation, Coloboma, Rupture.
- CILIARY REGION**—Sympathetic Irritation, Sympathetic Ophthalmitis.
- CONJUNCTIVA**—Ophthalmia, Neonatorum, Gonorrhœal, Mucopurulent, Diphtheritic, Granular. Xerophthalmia. Pinguecula. Pterygium.
- CORNEA**—Local Keratitis, Ulceration, Hypopion, Onyx, Syphilitic Keratitis, Punctate Keratitis, Arcus Senilis, Pannus, Periotomy, Conical Cornea, Wounds.
- EYELIDS**—Blepharitis, Styne, Tarsal Tumor, Warts, Rodent Ulcer, Syphilitic Ulcer, Lupus, Nævus, Ptosis, Trichiasis, Symblepharon, Entropion, Ectropion.
- GLAUCOMA**—Acute, Chronic, Secondary.
- IRIS**—Iritis, Iridectomy, Iridotomy, Iridodesis, Prolapse, Coredialysis, Congenital Irideremia, Coloboma, Mydriasis, Myosis.
- LACHRYMAL APPARATUS**—Mucocoele, Stricture of Nasal Duct, Fistula of Lachrymal Sac. Lachrymal Gland, Diseases of, Excision of.
- OPTIC NERVE**—Optic Neuritis, Atrophy.
- RETINA**—Retinitis, Syphilitic, Albuminuric, Apoplectic, Pigmented. Detachment. Glioma.
- REFRACTION**—Emmetropia, Ametropia, Presbyopia, Myopia, Hypermetropia, Astigmatism.
- STRABISMUS**—Internal, External, Operation.
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Cataract is an opacity of the crystalline lens. Various classifications are used. The following is perhaps the best: (1) *Central*; (2) *Cortical*; (3) *Lamellar*; (4) *Capsular*; (5) *Traumatic*; (6) *Secondary*.

1. **CENTRAL OR NUCLEAR**.—Opacity begins at the centre and shades off toward circumference. It mostly occurs in old people, when it is hard at the centre and of amber color. When occurring before the age of thirty-five it is softer and whiter.

2. **CORTICAL OR RADIATING**.—Opacity begins at the surface of lens as triangular or pyramidal streaks pointing toward centre. When advanced they involve whole structure of lens.

3. **LAMELLAR OR ZONULAR.**—Opacity consists of a shell-like layer deposited within the substance of the lens at a variable distance from its surface. It occurs in very young subjects (1 to 3 months), and is sometimes congenital; the subjects of it frequently suffer from infantile convulsions.

4. **CAPSULAR.**—(a) *Pyramidal*; (b) *Posterior Polar*. (a) *Pyramidal.*—Occurs as a very white well-defined opacity on front part of lens just beneath the capsule. It is generally caused by ulcer of cornea following purulent ophthalmia, and, consequently, is generally associated with opacity of cornea. (b) *Posterior Polar.*—Begins at posterior part of chief axis of lens and radiates; generally associated with disease of choroid and vitreous.

5. **TRAUMATIC.**—Follows wound of the lens capsule by which the aqueous humor is admitted to the lens substance, causing swelling, opacity, and final absorption of this, and leaving only a chalk-like deposit upon the remaining capsule.

6. **SECONDARY CATARACT** is so called when it is the result of some other local disease, as glaucoma, irido-cyclitis, etc., or of some general disease, as diabetes mellitus.

Any combination of the above forms would be called a *mixed* cataract. The degree of hardness of a cataract depends chiefly upon the age of the patient, all cataracts occurring before the age of thirty-five being "soft."

Diagnosis.—Gradual failure of sight without local inflammatory symptoms is a subjective indication of cataract. A grayish appearance of the pupil is often observed in old people, which is not due to cataract, the lens being transparent. When the presence of cataract is suspected the pupil should be dilated by atropine and examined. (1) *By daylight*, diffused rays condensed upon the pupil with a convex lens. (2) *By gaslight* in a similar way. These will give a white, amber-like, or brownish appearance of lens. (3) *By the ophthalmoscope*, when the opacity of lens will appear as dark patches, streaks, or a central nucleus; the red choroidal reflex will only be observed inversely as the amount of opacity. In *lamellar cataract*, a well-defined shell of opacity appears, surrounded by a clear (cortical) layer of lens substance, through which the bright red choroidal reflex is observed. When any portion of the lens substance remains clear, note should be made as to the state of the vitreous, optic disc, retina, and choroid, with a view to probable fitness for future operation. *Opacities of cornea* will also appear as dark patches with ophthalmoscope, and may be seen by superficial examination. *Opacities of vitreous* appear as moving bodies, and are distinguished by their continuing to move after the patient's eye has suddenly come to rest.

Treatment.—In early stages of nuclear cataract the sight may often be improved by moderate dilatation of the pupil by atropine. Use atropine drops, gr. iv. ad $\frac{3}{4}$ j., once or twice a week. Dark spectacles may be worn to favor dilatation of the pupil. In lamellar cataract patient can often

see fairly well. When vision is seriously impaired and the margin of translucency is *wide*, make an artificial pupil by iridectomy; when the margin is *narrow*, perform the operation of solution, or of extraction. In forms other than lamellar, sight can be restored only by one of the following methods of operating on the lens: (1) *Extraction*; (2) *Needle operation*; (3) *Suction*. (1) *Extraction*.—Various methods are in use at the present time, but all have the following common points: (1) An incision in the cornea or at the junction of the cornea and sclerotic, or in the sclerotic just beyond the cornea, sufficiently large to allow exit of lens. The incision is usually made with Von Graefe's straight knife. (2) Iridectomy is very frequently performed, either as a second stage of the operation or two or three weeks previously. This is done to lessen the danger of iritis, which more frequently follows the older operation in which iridectomy was not performed. (3) The capsule is freely ruptured by a sharp-pointed instrument introduced through the corneal wound. (4) The lens is removed through the torn capsule, either by pressure and manipulation outside the eye or by means of a scoop passed behind the lens. The chief types of operation for extraction are: (1) *Graefe's Modified Linear or Peripheral Linear*.—Here the incision is made with a long, narrow knife, slightly beyond the sclero-corneal junction, involving conjunctiva and forming a small arc of a circle larger than the cornea, the plane of incision forms a large angle with that of the iris. Iridectomy follows the incision. (2) The incision has nearly the same curve as the above, but is not carried so far toward sclerotic, being mostly in the cornea. Iridectomy is not usually performed here. (3) *Flap Operation* (old).—Incision just within margin of cornea, and concentric with it, equal to half its circumference, and parallel to plane of iris. Beer's triangular knife. No iridectomy. Disadvantages of modified linear operation: Frequent hemorrhage into anterior chamber. Greater risk of loss of vitreous. Risk of irritability from prolapse of iris into corners of wound, and of sympathetic ophthalmitis in the other eye. Disadvantages of the old flap operation: The large flap is liable to gape or fall forward, causing sloughing. Frequent prolapse of iris. Frequent severe iritis. *After-treatment* for either of these methods.—Keep the patient in bed for a week. Apply a piece of soft linen to the closed eyelids, and a pad of cotton wool over this to both eyes, and secure by a four-tailed bandage. Keep the room nearly dark. Remove dressing, and gently cleanse the lids with warm water twice daily, just separating their edges to allow escape of tears that may be retained. Use one drop of atropine solution daily after the third day to prevent iritic adhesion. During the first few hours there will be some soreness, and the first dressing a little blood-stained; after this there should be no pain, and only a little mucous discharge. If doing well there will be slight congestion, but no chemosis, edges of wound united, and pupil black. Discontinue bandage after eight or ten days, and order a large shade.

2. NEEDLE OPERATION FOR SOLUTION.—(1) Dilate pupil by atropine. (2) Give anæsthetic unless the patient is old enough to control himself well. (3) Hold lids open by stop-speculum, and use fixation forceps to steady globe. (4) Direct a fine cataract needle to a point just within the margin of the cornea, plunge freely and obliquely through into anterior chamber, and carry point to centre of pupil. (5) Dip point of needle back through the capsule into superficial layers of lens at centre, make a few gentle to and fro movements, so as to break up its substance, then steadily withdraw the needle. *After-treatment*.—Dilate the pupil with atropine (gr. iv. ad $\frac{3}{4}$ j.) three times daily. Bandage the eye lightly, and employ dark room for several days. In case of iritis apply leeches to region of eye, and ice or evaporating lotions to lids. The result varies with the amount of the opacity of the lens. In cases of complete cataract no marked change will be observed for some weeks after operation. In partial cataract the ruptured portion of the lens will become opaque and swollen in a few days, and in seven weeks the lens will be smaller. After six to eight weeks, if the eye be perfectly quiescent, and not otherwise, the operation may be repeated, and the needle used more freely. A third or fourth operation may be required.

3. SUCTION OPERATION.—Only applicable to soft cataract, and requires great skill in its performance, to avoid danger of iritis, or cyclitis. (1) Dilate pupil with atropine. (2) Make oblique opening in cornea with a broad-cutting needle between its centre and its margin, and lacerate capsule freely. (3) Withdraw needle and pass nozzle of syringe through wound, and dip into lacerated lens-substance. In lamellar cataract, and some other cases, it is necessary to allow an interval of three days between the needle operation and the suction, in order that the lens may be softened by the admission of the aqueous. (4) Use very gentle suction, and remove if possible the whole of lens-substance at one sitting. *After-treatment* is the same as for needle operation (but in the case of waiting, careful watch must be made, and suction performed *at once* if inflammation be set up by the rapid swelling of the lens).

When to Perform Extraction.—The more complete the opacity of the lens, the more easily is it shelled out of its capsule, whilst in immature cataract some of the transparent lens-substance is apt to remain; this will become opaque and may interfere with result of operation. The signs of this “ripe” condition are: (1) No shadow of iris thrown upon lens within the pupillary area; (2) no choroidal reflex with ophthalmoscope; (3) patient is able to distinguish light from darkness, but is unable to count fingers when held up before the eyes. When one eye only is affected, or when one is less affected than the other, extraction should be deferred until the better eye is no longer useful, unless for special reasons. When both cataracts are mature, only one should be operated on at a time, with an interval of a few months. When there is no percep-

tion of light do not operate, as cataract alone is not sufficient to prevent this.

Occasional Results of Extraction.—1. *Sloughing of cornea*, very rare since flap operation was abandoned. 2. *Suppurative inflammation* extending from wound to the whole cornea, iris, and vitreous, variable in degree, but, when established, generally going on to suppurative panophthalmitis, or to severe plastic irido-cyclitis with corneal opacity and contraction of eyeball. 3. *Iritis* of a plastic nature which deposits a membrane in pupillary area. 4. *Prolapse of iris* into the wound, either at the time of operation or afterward.

Conditions of Sight after Operation.—Results are good when, with the aid of proper spectacles, patient can read any of Snellen's test types from No. 1 to No. 14 at 22 centimetres (8 inches), and from No. 6 to No. 24 at 6 metres (20 feet). The operation renders the eye very hypermetropic for want of the lens. Very strong convex glasses are required to compensate for its absence. Glasses should not be worn for three months after operation, and then not continuously at first. Two pairs of spectacles are needed, one pair making the eye emmetropic and giving clear vision for distant objects (about + 12 dioptries), the other pair stronger, to render the eye myopic, so that the patient is able to read, etc., at about 8 or 10 inches (about + 16 dioptries).

Choroid.—DISEASES.—1, *Hypercæmia*; 2, *Choroiditis*; 3, *Sclerotico-choroiditis Posterior*; 4, *Tubercle*; 5, *Tumors*; 6, *Bone Formation*; 7, *Coloboma*; 8, *Rupture*.

CHOROIDITIS may be (1) *Syphilitic*, (2) *Simple*, (3) *Suppurative*.

SYPHILITIC CHOROIDITIS is the most common. It is characterized by the presence of numerous distinct patches scattered about fundus, but most abundant toward periphery; they are at first of a yellowish red appearance, which soon changes to yellowish white or glistening white, according to the extent of choroidal atrophy. The patches are more or less pigmented. Vision is affected in proportion to the extent of the disease. Usually no pain. Generally a history of acquired or inherited syphilis. *Treatment.*—Mercury combined with iodide of potassium. Rest of eyes by means of dark room. Artificial leech or dry cupping to temples. In the early stage mercury does great good, and in old cases where failure of sight is increasing it should be given. *Prognosis*, guarded.

SIMPLE CHOROIDITIS.—In this form the patches of atrophy are similarly distributed but are confluent (compare with syphilitic form). Or, large areas of incomplete atrophy are interspersed with separate patches, or there may be a widespread superficial atrophy with pigmentation. The field of vision is here also affected in proportion to the change.

SUPPURATIVE CHOROIDITIS is acute, and occurs in conjunction with similar inflammation of neighboring parts (panophthalmitis).

SCLEROTICO-CHOROIDITIS POSTERIOR is limited to the regions of the optic

disc and yellow spot, which present many varieties of localized change. It is common in myopic eyes, and the appearances thus produced are known as "posterior staphyloma," "myopic crescent," etc.

TUBERCLE OF CHOROID appears in the form of small circular, circumscribed spots (0.3 to 2.5 mm.), situated chiefly in the region of optic disc.

TUMORS.—1, Sarcoma ; 2, Carcinoma.

BONE FORMATION sometimes occurs on the inner surface of choroid of eyes which have been long destroyed ; it varies in thickness from a mere film to a dense osseous cup.

RUPTURE OF CHOROID may occur from a blow on the globe and may exist with or without rupture of other coats. Hemorrhage at once occurs, and blood may be effused (1) between choroid and retina ; (2) between choroid and sclerotic ; (3) into vitreous.

Ciliary Region.—**SYMPATHETIC IRRITATION** and **SYMPATHETIC OPHTHALMITIS.**—In sympathetic irritation the changes in the sympathizing eye are chiefly functional. In sympathetic ophthalmitis they are of a destructive inflammatory kind.

Pathology.—The exact mode of transmission from the exciting to the sympathizing eye is not well known. Very interesting facts are known.

1. The change commences in the region of the ciliary body and iris of the exciting eye, and its effects are mostly seen in the corresponding part of the sympathizing eye. This region is richly supplied by branches of ciliary nerves (fifth, sympathetic, and third).

2. In exciting eye inflammatory changes are always found, and in some cases have been found to extend to the ciliary nerves. It is considered probable that the disease passes along the ciliary nerves, probably as neuritis, to some nerve-centre, and thence to the other eye.

3. The optic nerve is considered to have no part in the transmission of the inflammation ; but the space between the dural and pial sheaths of the optic nerve is a probable channel of communication.

Symptoms in Sympathizing Eye.—1. *Irritation.*—Eye extremely weak and irritable ; patient may be able to read No. 1 of Snellen's type, but soon becomes tired, because the power of prolonged accommodation fails. Eye sometimes reddened, may be watery ; neuralgic pains common. Iris not affected. *No plastic exudation nor disorganizing changes take place.* Liable to recur. Excision of exciting eye at once cures the disease.

2. *Ophthalmitis.*—Begins from one to three months, or more, after affection of exciting eye. May be ushered in by irritation. May be well marked from the first, or may commence in a manner so insidious as to escape notice. It consists chiefly of irido-cyclitis or irido-choroiditis, the iritis evincing a tendency to the formation of tough and extensive synechiæ. There is a zone of ciliary congestion. Thickening and muddy appearance of iris. Tendency to formation of dots of opacity (keratitis punctata) on the posterior layer of the cornea. The vitreous, when the

condition of the pupil allows it to be seen, presents floating opacities. There may be neuro-retinitis. Tension of globe often increased. In the mildest forms of the disease there may be only slight serous iritis. In severe cases the eye either shrinks or may become glaucomatous with bulging of the sclerotic, total posterior synechia, secondary cataract.

Treatment.—1. When there is, as yet, neither sympathetic irritation nor sympathetic ophthalmitis, the injured eye must be watched as to the seat of its inflammation, and, if this is found to threaten the iris and ciliary region, precaution must be taken to do all that is possible to subdue it. Atropine should be applied. Patient kept in dark room for long period; eye bandaged. Mild mercurials and iodide of potassium internally.

2. If irritation is set up, the foregoing remedies to be applied to *both* eyes, and if the exciting eye is past hope of recovery it should be *excised at once*.

3. If ophthalmitis is established and exciting eye *quite blind* it should be excised at once; but if any useful sight remains it should be saved, as it may prove the better eye in the end.

In the latter case do all you can to save both the exciting and the sympathizing eye. (1) Use atropine drops every few hours; (2) rest the eyes by exclusion of light; (3) apply leeches, blisters, warm fomentations, etc.; (4) give mercurials.

Do not perform any operation on the eye until inflammation has subsided.

Conjunctiva.—**OPHTHALMIA.**—This term is applied to all forms of conjunctivitis. Chief forms are—1, *Purulent*; 2, *Muco-purulent*; 3, *Membranous*; 4, *Granular*.

PURULENT OPHTHALMIA is generally due to contact with pus from the urethra or vagina, which may be gonorrhœal or otherwise. The *quality* of the infecting discharge greatly influences the nature of the ophthalmia. When caused by *gonorrhœa* the course is very violent. When occurring in newly born children it is called *O. neonatorum*.

Symptoms.—In from twelve to forty-eight hours after infection there are itching and slight injection of the conjunctiva, these soon become intense; then chemosis, tense swelling of the lids, great pain and discharge, at first serous, then turbid, then uniformly purulent. If untreated the discharge ceases in about six weeks, leaving the palpebral conjunctiva thickened, relaxed, and more or less granular. Cicatricial changes follow. The cornea is in danger from two chief causes, viz.: (1) strangulation of the vessels from pressure, and (2) the influence of the discharge. If within the first few days the cornea be hazy and dull, it may partly or entirely slough. In milder cases transparent ulcers may appear and sometimes cause perforation. In many cases no corneal opacity occurs.

Treatment.—When one eye only is affected, carefully protect the other by a watch-glass strapped on. Frequently and thoroughly remove the

discharge by free douching with water. Use astringent or caustic lotions or drops every hour in severe cases, *e.g.*, lotio aluminis, gr. x. ad $\frac{3}{4}$ j.; lotio zinci, gr. x. ad $\frac{3}{4}$ j.; lotio hydrarg. perchlor., gr. $\frac{1}{2}$ ad $\frac{3}{4}$ j.; lotio argent. nit., gr. ij. ad $\frac{3}{4}$ j. Apply simple ointment to the eyelids to prevent adhesion. Evert the lids and brush a strong solution of nitrate of silver (gr. x. or xx. ad $\frac{3}{4}$ j.) freely over the conjunctiva once daily, and well wash off immediately afterward either with water or with solution of common salt. Repeat less frequently as the discharge diminishes. In cases where the lids are so swollen that nothing can be applied to their conjunctival surfaces, the outer canthus can be divided, or Mr. Critchett's method of dividing the upper lid by a vertical incision can be adopted.

Treatment should be continued as long as any discharge or granulations remain on the lids, for fear of a relapse which is apt to occur.

MUCO-PURULENT OPHTHALMIA (Catarrhal Ophthalmia).—Very common, very contagious, mostly attacks both eyes, differs in severity in members of the same household, who are generally attacked at the same time. *Symptoms.*—Congestion of conjunctiva, with patches of ecchymosis. Gritty pain, sometimes severe. Spasm of lids. Free muco-purulent discharge. Lids somewhat swollen and red, never tense. The cornea seldom suffers. Spontaneous recovery takes place in about two weeks. *Treatment.*—Any mild astringent lotion or drops will cut the malady short. An outbreak of this malady in a crowded community is serious. Very common in pauper schools.

MEMBRANOUS OPHTHALMIA (Diphtheritic Ophthalmia).—Very rare in this country, and must not be confused with muco-purulent or purulent ophthalmia, in which there is often a distinct layer of inspissated pus beneath the lids. In membranous ophthalmia the whole thickness of the conjunctiva is occupied by a solid exudation, which is called "diphtheritic" by some surgeons. It may appear in patches, or may cover all the whole inside of the lids.

GRANULAR OPHTHALMIA.—Very common. *Symptoms.*—Firstly, appearance as of small granules like sago-grains on the inner surface of the lower lid, due to inflamed lymphatic follicles. These extend to upper lid; then progressive changes in the palpebral conjunctiva in which it becomes thickened, vascular, and roughened by granular elevations. New tissue is formed in the deep parts of the conjunctiva, which afterward is partly absorbed, and partly undergoes cicatricial contraction. *Causes.*—Feeble health. Prolonged residence in badly-ventilated dwellings. *Treatment.*—Generally tedious. Evert the eyelids and apply a solution of nitrate of silver (gr. xx. ad $\frac{3}{4}$ j.) with camel's-hair brush, once, twice, or thrice a week; or apply the mitigated nitrate of silver stick; in each case wash the lids with water before inverting them. Solid sulphate of copper may be used instead of these. Glycerine of tannin applied daily is beneficial. *Results.*—(1) Haziness of cornea; (2) Pannus (see cornea); (3) Entropion, Trichiasis.

XEROPHTHALMIA (Xerosis, Cuticular Conjunctiva) is a condition of excessive dryness of the ocular and palpebral conjunctivæ.

PTERYGIUM is a triangular patch of thickened conjunctiva, generally placed opposite the palpebral fissure, its apex pointing to or encroaching upon the cornea. Rare in this country. *Treatment*.—Dissect up from apex and transplant it into a cleft below the cornea. This is said to be more effectual than excision or ligature.

PINGUECULA, a harmless patch of yellowish white thickened conjunctiva situated near margin of cornea.

Lupus may occur on conjunctiva.

Warts are sometimes seen on the ocular and palpebral conjunctivæ; they are cauliflower excrescences. To be snipped off with scissors.

Epithelioma and *Sarcoma* may occur on the conjunctiva.

Cornea.—*Inflammation* of the cornea may be circumscribed or diffused, may involve its proper layers, or may be confined to its anterior or posterior epithelial layer. It may be *local*, leading generally to suppuration or ulceration, or it may arise from *constitutional* disease, as inherited syphilis. It may exist with other inflammations, as in kerato-iritis, cyclo-iritis.

LOCAL KERATITIS (Corneitis).—*Symptoms*.—Commences with a more or less perfect zone of pinkish-red vessels around the margin of the cornea. Photophobia more or less severe. Cornea becomes hazy, and has a steamy or ground-glass appearance. Generally there is lachrymation, and frequently pain in and around the eye. *Pathology*.—The intercellular substance becomes opaque from infiltration with leucocytes, which are supposed to have emigrated from the surrounding vessels. The cells of the corneal tissue proper also undergo proliferation into small corpuscles, greatly resembling leucocytes. The disease often has a tendency toward recovery, but more frequently leads to suppuration and ulceration.

Ulceration of Cornea is preceded by inflammatory infiltration, and the inflamed part breaks down at the centre, forming an ulcer with more or less infiltrated base and edges. *Symptoms*.—Photophobia, congestion more or less, consisting of a circular zone of vessels beneath the conjunctiva at periphery of cornea, and *sometimes* also of conjunctival vessels. Pain sometimes acute,

Ulcers may be (1) *small and central*, with infiltration of base and edges. These generally heal quickly, but leave a hazy (nebula) or an opaque spot (leucoma).

2. *Small and central*, without much infiltration. These heal slowly and with loss of tissue, perhaps without opacity, but give a *faceted* appearance to the cornea.

3. *Phlyctenular ulcers* (Herpes corneæ).

4. *Serpiginous ulcers*.

5. *Acute suppurating ulcer* following abscess or otherwise. *Treatment*.—First secure rest, either by bandaging the affected eye, and so reducing

friction against eyelids, or by shading both eyes. Soothe local pain by atropine drops. In suppurating cases apply hot fomentations to lids; if abscess is defined, open by valvular incision. When indolent, stimulate ulcer by astringent drops, ointment of yellow oxide of mercury, calomel powder, eserine drops (gr. iij. ad. $\frac{3}{4}$ j.), etc.

Counter-irritants to temple, as *seton* or *blister*. Constitutional treatment.

HYPOPION signifies a collection of pus or purulymph in the lowest part of the anterior chamber. The pus is derived (1) from the rupture of an abscess through the posterior layer of the cornea; (2) from suppuration of the epitheloid layer covering Descemet's membrane; (3) from surface of iris.

ONYX is a term applied to that condition in which pus is observed between the layers of the cornea at its lower part.

SYPHILITIC KERATITIS (Interstitial K. Parenchymatous K.).—*Symptoms*.—The visible changes of the cornea are usually preceded for a few days by some ciliary congestion and lachrymation; then there is cloudiness in one or more patches, and after a few weeks a ground-glass appearance. Frequently accompanied by iritis and posterior synechiæ. Blood-vessels often appear in the layers of the cornea, extending from the ciliary vessels; they are thickly set in patches (salmon patches) of a reddish pink color, and of various shapes; they may extend all over the cornea, except, perhaps, to the immediate centre. The disease is always symmetrical (contrast with local keratitis), but second eye is usually attacked a few weeks after the first. Age generally between six and fifteen. Often accompanied by inflammation of the ciliary region and iris, *which may give rise to secondary glaucoma*, to stretching and elongation of the globe in the ciliary zone, or to softening of the eyeball; but, *as a rule*, the cornea throughout its whole structure undergoes a chronic inflammation, showing no tendency either to suppuration or ulceration, the inflammatory products being partially or entirely absorbed after several months. *Cause*.—Inherited syphilis. Other signs of inherited syphilis are usually present. (See CONGENITAL SYPHILIS.)

If no other signs are shown in the patient, a history of infantile syphilis can generally be ascertained, either in the patient or his brothers and sisters; or a history of acquired syphilis in the parents may be traced. A few cases have been seen in which this disease has occurred as the result of acquired syphilis.

Treatment.—A long but mild course of mercury. Mercurial inunction, gray powder, blue pill, etc. Iodide of potassium may be combined with these. Keep a strict watch against salivation. If the patient be anæmic or strumous, give iodide of iron, bark, quinine, etc. Keep the eyes shaded. Use atropine drops daily, as iritis may occur without being detected through the opaque cornea. When inflammation has subsided, apply calomel powder or ointment of yellow oxide of mercury to the cornea daily, in order to promote the absorption of the opacity.

KERATITIS PUNCTATA is characterized by the presence of small dots of opacity on the posterior elastic lamina of the cornea. They are generally arranged in the form of a triangle, having its apex at the centre, and its base toward the lower margin of the cornea. This condition is generally secondary to some form of inflammation of iris. It is frequently seen in sympathetic ophthalmitis.

Arcus senilis is caused by fatty degeneration of the corneal tissue just within its margin.

PANNUS is the result of friction from a granular condition of the upper lid, trichiasis, etc. It is characterized by haziness of the cornea, with vascularity, the vessels being continuous with those of the conjunctiva, and the anterior layers of the cornea more or less infiltrated with plastic matter. *Treatment*.—1. Try to cure the granular lids. 2. The operation of *syndectomy* or *peritomy*—that is, the removal of a zone of conjunctival and sub-conjunctival tissue from around the cornea—is strongly recommended by Mr. Critchett in old intractable cases of pannus. 3. Very severe and universal pannus is best treated by *inoculation* with pus from purulent ophthalmia, or even from gonorrhoeal discharge. It is a severe remedy, and may be followed by sloughing of cornea. It should *never* be resorted to if there is any portion of the cornea transparent.

CONICAL CORNEA is caused by a bulging forward of the central part of the cornea forming a blunt conical curve, which gives rise to irregular astigmatism and myopia. In advanced cases the protrusion of the cornea is very evident, and the apex of the cone may become nebulous. In some cases vision may be improved by concave glasses in combination with a screen having a narrow slit or small hole in it. In advanced cases operation is needed: (1) Graefe's. Shave off apex without entering anterior chamber, then apply mitigated nitrate of silver stick to the raw surface to cause ulceration and cicatrization. (2) Cut off apex with a cataract knife, enter anterior chamber, leave wound to unite by itself or use sutures; use atropine drops.

Wounds of Cornea.—When penetrating, if iris is prolapsed push it back with a blunt instrument, and order atropine drops; if iris not protruding, order atropine drops. If only abraded, still order atropine drops. Close the eye with a bandage to prevent friction.

Eyelids.—Blepharitis, Styte, Tarsal Tumors, Warty Growths, Molluscum Contagiosum, Ulcers, Rodent Ulcer, Ptosis, Ectropion, Entropion, Symblepharon.

BLEPHARITIS (*tinea tarsi*, *ophthalmia tarsi*, *sycosis tarsi*) is an inflammatory condition of the edges of the eyelid, which commonly attacks the glands and the follicles of the eyelashes. It varies in degree from mere congestion, with a sticky exudation, to chronic or subacute inflammation, with thickening of the tissues, excoriations, and even pustules. *Treatment*.—(1) Keep the eyelids clean and free from scabs by bathing twice daily

with warm water or warm alkaline lotion. (2) Apply dilute nitrate of mercury ointment twice daily; in severe cases pull out the lashes with epilation forceps, and apply nitrate of silver to the edges of the lids.

STYE (hordelum) is a small furunculus at the margin of the lid, often very painful. Successive crops very common. *Treatment*.—Foment with warm water, apply bread-and-water poultice; puncture with a sharp lancet as soon as pointing has commenced.

TARSAL TUMOR (meibomian cyst, chalazion), a chronic hypertrophy of a meibomian gland, occurs as a small hard nodule from 1–4 mm. in diameter in upper or lower lids; one or more may appear at the same time. The skin is freely movable over the tumor, which is hard, and not painful. If left alone it generally causes thinning of the conjunctival tissue, or it may point through the surface. *Treatment*.—Evert the lid and remove by incision from the conjunctival surface. When it points outward it is better to remove through the skin by incision parallel to margin of eyelid. When thus thoroughly removed it does not recur. When only incised it may remain for some time.

WARTY GROWTHS occasionally appear on edges of lid. Remove freely with scissors.

MOLLUSCUM CONTAGIOSUM often appears in region of eyelids. Consists of one or more hemispherical elevations of from one to six mm. in diameter, containing sebaceous material. *Treatment*.—Divide each little tumor by vertical incision, and squeeze out the contents by means of the thumb-nails applied to the bases of each.

RODENT ULCER (epithelial cancer, rodent cancer) begins as a slight elevation near margin of eyelid; this is followed by a shallow ulcer with slightly indurated edges, and generally a brownish incrustation. Mostly occurs in persons over forty. Progresses slowly. Seldom cicatrizes. Attacks all surrounding tissues. Neighboring glands not enlarged. *Treatment*.—Remove all the diseased structure with the knife, or with the thermal cautery, as early as possible. In severe cases apply chloride of zinc paste in addition, after removal with the knife.

SYPHILITIC ULCERS are more acute, more punched out in appearance, have less indurated margins, and are more amenable to treatment than rodent ulcer.

LUPUS generally occurs in younger subjects, and in other parts of the face. It is less indurated and more inflamed than rodent ulcer.

NÆVUS, often congenital, occasionally occurs on the eyelids, may be confined to the skin, or may involve subcutaneous tissue. *Treatment*.—1. By electrolysis. 2. By subcutaneous ligature. 3. By galvano-puncture.

PTOSIS is partial or complete closure of the upper eyelid. Causes, various. May be congenital and due to non-development of the levator palpebræ superioris muscle. May be due to paralysis of the third nerve, which supplies that muscle. May be the result of injury to that muscle.

Treatment varies with cause. Graefe's operation; make incision through skin three lines above the margin of upper lid, and extending through its whole length, and expose the orbicularis palpebrarum muscle; seize the muscle with forceps, excise a portion about five lines in width. In bringing edges of skin together pass the suture through the cut edges of the muscle.

TRICHIASIS, ingrowing of the eyelashes, causing irritation of the globe. Frequently caused by contraction of the tissues after granular lids and after the application of caustics to inside of lids. *Treatment*.—If only a few lashes are turning in, these may be removed with epilation forceps. If many exist, then excision of the hair-bulbs should be performed as follows: Fix the lid by means of compressorium forceps. Make two incisions along the margin of the lid, one on each side of the row of eyelashes. Cut deeply, unite the incisions at each end, and remove the piece with scissors. Sutures not required.

SYMBLEPHARON is union of the palpebral and ocular conjunctivæ or of the margins of the eyelids. Caused generally by burns, as with molten lead, or caustic, as quicklime. *Treatment*.—1. When the edges of only the lids are united, or when a probe can be passed beneath the united conjunctivæ; (a) simply divide adhesions with knife, and keep the parts separated by means of oiled lint; (b) pass a strong silk ligature beneath the bands, and tie tightly, allowing the ligature to come away by itself. 2. When no probe can be passed beneath the adhesions, the results of operation are less satisfactory. Separate the parts by incision, and then dissect up the conjunctiva on both sides, and endeavor to bring the flaps thus formed over the raw surface by means of very fine silk sutures; still keep the ocular and palpebral portions apart by oiled lint.

ENTROPION.—Inversion of the eyelids, generally caused by cicatrices after caustics such as lime or nitrate of silver, or after injury. *Treatment*.—When very severe, and the conjunctiva is much contracted, remove the whole row of eyelashes as recommended for trichiasis. When less severe, perform Streatfeild's operation of grooving the cartilage.

ECTROPION.—Eversion of the eyelid; may be partial or entire. *Causes*.—Contraction after injury or inflammation of the parts of the eyelid which are external to the tarsal cartilage; or contraction of cicatrices of the face following burns, lupus, etc. *Treatment*.—Try to prevent the progress of eversion by skin-grafting on to wounds of face. When permanently established try a plastic operation.

Glaucoma is so called from the occasional greenish appearance of the pupillary area. The pathognomonic symptom in all cases of glaucoma is increased hardness or "tension" of the eyeball.

Classification.—1, *Acute*; 2, *chronic*; 3, *secondary*.

ACUTE GLAUCOMA.—*Early Symptoms*.—Increased tension. Rapidly increasing presbyopia. Periodic dimness of sight. Halos or "rainbows" around the candle or other lights. Diminution of the field of vision.

Later Symptoms.—Acute pain. Congestion of conjunctiva, and of ciliary region. Dilated and sluggish pupil. Rapid impairment of vision. Tension of globe much above normal, $T + 1$ to $T + 3$ or $T + 4$. There may be turbidity of the vitreous obscuring the fundus, otherwise the *ophthalmoscope* reveals—1, cupping of the whole of optic discs, the edges being abrupt; 2, probably pulsation of the retinal vessels; 3, tortuosity of the veins; 4, small hemorrhages occasionally.

CHRONIC GLAUCOMA presents the same symptoms as the acute form, but in a modified degree. The tension of the globe is above normal, $T + \frac{1}{2}$ to $T + 1$ or $T + 2$, but the increase of tension is less rapid. The pain is much less, and may be absent altogether.

SECONDARY GLAUCOMA is so called when occurring as a result or complication of some other disease or injury of the eye, as iridochoroiditis, needle operation, etc. It is a very grave symptom.

Pathology.—What is the cause of the increased tension? Theory 1. Active contraction of the sclerotic. 2. Excess of fluids of eye from increased supply of blood. 3. *Defective removal* of fluids from eye.

The region of the ciliary body is generally found to have undergone great changes. It becomes shrunken to half its natural size, its muscular fibres are atrophied and sclerosed. The base of the iris is found to be closely applied to the marginal part of the cornea. The ciliary arteries are enlarged. The changes are supposed to impede the escape of fluid from the anterior chamber, and perhaps from the vitreous also. The glaucoma cup is caused by pressure from within. The lamina cribrosa which forms the floor of the optic disc, being the weakest part of the capsule of the eye, slowly yields, becomes depressed and hollowed out, causing atrophy.

Treatment for Acute Glaucoma.—Perform iridectomy without delay. (1) Make incision partly in cornea and partly in sclerotic. (2) Make wound large enough to allow of exit of one-fifth of iris. (3) Remove iris quite up to its ciliary attachment.

Apply leeches to eye, and warmth: give purgatives and derivatives internally.

In Chronic Glaucoma.—First try action of eserine drops, with local depletion, and calomel and opium internally. If tension *continues to increase* perform iridectomy as in acute cases.

Sclerotomy, by similar incision to that of the scleral iridectomy, but without removing a portion of iris, is sometimes practised. Trephining the sclerotic behind the ciliary region has also been introduced, but these are both less efficient than iridectomy.

Iris.—**IRITIS.**—*Causes.*—Syphilis. Rheumatism. Inflamed or ulcerated cornea. Injuries as in operation for cataract.

Symptoms.—(1) Change in color; (2) change in mobility; (3) change in vascularity; (4) pain; (5) impairment of vision; (6) photophobia and lachrymation.

(1) *Change in color* is due to congestion, and to effusion of lymph and serum into the texture of iris, as well as, in part, to turbidity of aqueous. It looks blurred and "muddy."

(2) *Change in mobility* is indicated by the pupil not responding actively to light, but becoming sluggish or quite inactive. The iris becomes more or less adherent by its posterior surface to the capsule of lens, constituting partial or complete *posterior synechia*; when *partial* the pupillary margin becomes jagged under atropine; when complete, the pupil cannot be dilated by mydriatics. When exudation of a layer of lymph takes place into the pupillary area the condition is termed "occlusion."

When margin of pupil is adherent to lens capsule by its whole circumference the condition is termed "exclusion."

(3) *Increase of vascularity* in the ciliary zone, around the margin of the cornea, generally occurs early, and the conjunctival vessels are generally congested.

(4) *Pain* of a neuralgic character in and around the eye, variable in degree.

(5) *Impairment of vision* is always more or less marked, may be owing to turbidity of aqueous, exudation of lymph on capsule in the pupillary area, impairment of accommodation by extension of inflammation to the ciliary body.

(6) *Photophobia and lachrymation* may or may not be present.

In *Syphilitic Iritis*, which only occurs in secondary syphilis, there is tendency to effusion of lymph, and formation of nodules in the structure of the iris. It seldom relapses; it is often symmetrical; pain not generally severe.

In *Rheumatic Iritis* there is little tendency to effusion of lymph, nodules never formed, generally unsymmetrical, although both eyes may suffer in turns; frequently relapses at intervals of months or years; congestion and pain often severe; sight not much affected.

Treatment.—(1) Use atropine drops (atropiæ sulph., gr. ij. ad. ʒ j.) three times daily to prevent adhesions, or to break down those which may have recently formed, also to relieve pain and congestion.

(2) If pain and congestion be severe apply leeches to temple, malar eminence, or septum nasi; repeat if necessary; apply blister to temple; avoid stimulants.

(3) For syphilitic iritis employ the treatment proper for secondary syphilis. For rheumatic iritis give alkalies, iodide of potassium, colchicum.

(4) Rest the eyes; all eye work to be discontinued; order a shade for both eyes; darken the room, or bandage the affected eye with a pad of cotton-wool, especially in rheumatic cases.

(5) Iridectomy should be performed (1) in those cases in which judicious local and internal treatment have been tried for several weeks with-

out benefit; (2) where adhesions exist and attacks are recurrent; (3) when there is complete exclusion of the pupil.

OPERATION OF IRIDECTOMY.—(1) Separate lids by a spring-stop speculum. (2) With lance-shaped knife incise sclerotic one line from corneal margin, and let the point enter anterior chamber just in front of iris, keeping point well forward to avoid wounding the lens. (3) Introduce iris forceps through wound, and seize iris near pupillary margin; draw this out through wound and cut off with fine scissors.

ARTIFICIAL PUPIL is mostly made by (1) iridectomy; but for cases in which this is unsuitable one of the following methods may be adopted: (2) by using a broad needle and hook; (3) by iridodesis, or ligature of iris (Critchett's operation); (4) by division of iris with Wecker's scissors introduced into anterior chamber (iridotomy).

Prolapse of Iris generally follows penetrating and incised wounds of cornea. *Treatment.*—(1) By removal of prolapsed portion with fine scissors. (2) By compress applied externally over closed lids. (3) By frequent puncturings of the prolapsed iris with a fine needle. In either of these methods a soothing treatment should be adopted. Atropine drops three times daily; bathing with belladonna lotion. After some days a shade should be worn, and the eyes carefully watched.

Corediylisis is a partial detachment of the iris from its ciliary border, forming a second pupil. It is generally caused by a sharp blow. Congenital irideremia (absence of iris) is occasionally seen.

Coloboma of the Iris (congenital cleft) appears like a very regular result of iridectomy downward, or downward and inward; usually symmetrical; variable in degree; generally associated with a corresponding defect in the choroid.

Mydriasis (dilatation of the pupil) is a derangement which may be caused by disease or by the action of mydriatic drugs, *e.g.*, glaucomatous tension of the globe, diseases of choroid or retina, optic atrophy, paralysis of third nerve. *Mydriatics*, sulphate of atropia, extract of belladonna, sulphate of duboisine, sulphate of daturine, etc.

Myosis (contraction of pupil) may be caused by spasmodic action of the circular fibres of iris, loss of power of radiating fibres of iris, hyperæsthesia of retina, affection of spino-sympathetic filaments which supply the radiating fibres of iris, myotic drugs, *e.g.*, Calabar bean, sulphate of eserine, nitrate of pilocarpine.

Lachrymal Apparatus.—Overflow of tears (lachrymation, epiphora, stillicidium) is caused by excessive secretion, or by some defect in the lachrymal apparatus which prevents the escape of the tears. This defect may exist (1) at the punctal achrymalia, which may be displaced or obstructed; (2) in the canaliculi, which may be obstructed by stricture near the sac or by foreign body; (3) in the lachrymal sac or nasal duct.

INFLAMMATION OF THE LACHRYMAL SAC is very common; generally caused

by stricture of the nasal duct. *Symptoms*.—Lachrymation, presence of a tumor (mucocoele) at the inner canthus, which may often be emptied by pressure with the finger, the contents passing upward through canaliculi, or downward through nasal duct. The contents of the sac vary according to the character of the inflammation. At first it consists of viscid mucus, which may remain a long time, or may become semi-purulent; in more acute inflammation there is abundant suppuration with swelling of surrounding parts, and pointing either through the skin, when a lachrymal fistula is established, or through the conjunctiva near the caruncle. *Treatment*.—1. Slit up the canaliculus, and so give free exit to contents of sac. This may be done upon Critchett's director, or by passing a Weber's canaliculus knife, or by a pair of delicate scissors. 2. Endeavor to cure the stricture of the nasal duct by passing a lachrymal probe every third day until lachrymation ceases. Various kinds of lachrymal probes are used, as Bowman's, Couper's, Weber's.

Fistula of lachrymal sac frequently occurs in acute inflammation—a small tortuous sinus between the sac and the skin, from which a continuous oozing of the tears on to the cheek takes place. *Treatment*.—(1) Cure the stricture and restore the mucous membrane to a healthy condition. (2) If necessary, pare the edges of fistulous opening, and bring together by fine suture.

Lachrymal Gland.—Hypertrophy, acute and chronic inflammation, abscess, fistula, cysts, sarcoma. *Removal* sometimes required for disease or for obstinate cases of lachrymation. *Operation*.—Make incision below upper and outer third of the orbital ridge through skin and the fascia: feel for gland with finger, seize with hooked forceps, draw forward, sever with knife, do not close wound till hemorrhage has ceased.

Optic Nerve.—Diseases: Neuritis; Atrophy.

OPTIC NEURITIS may extend from the brain to the retina (descending); may commence at the optic disc (papillitis) and thence pass along the nerve (ascending). When the disc is affected there may be (a) simple congestion; (b) congestion with swelling, which renders the outline of the disc more or less obscure. *Causes*.—Cerebral tumor, meningitis, syphilis, albuminuria, lead-poison, wound of cornea, hypermetropia. The sight is affected in proportion to the change in the optic nerve fibres. There may be lessened acuteness of vision, limitation of field of vision, altered color perception. *Treatment*.—Endeavor to find the cause of the malady and treat this. Rest the eyes. In cases where syphilis is a known cause, give a prolonged but mild course of mercury and iodide of potassium. When syphilis is the probable cause, give iodide, and in the early stage give mercury also. In strumous cases, pursue tonic treatment.

ATROPHY OF OPTIC NERVE may commence without any visible inflammation of disc (primary), or may follow as a result of papillitis. The optic disc varies in appearance from slight pallor to bluish-white. The vessels

may be of normal size, or may be much atrophied. *Treatment*.—Give quinine and iron internally. Phosphorus, nitrate of silver and strychnine are each sometimes employed. Try the interrupted voltaic current.

Retina.—The healthy human retina is so transparent during life that it is hardly seen with the ophthalmoscope. The vessels of the retina are seen radiating from the optic disc. Inflammatory and other deposits in the retina are also seen when present. The chief diseases of the retina are, Hyperæmia, Retinitis, Detachment, Embolism of the Central Artery, Glioma, Cysts.

HYPERÆMIA.—Generally caused by overwork, especially if patient be ametropic. Fundus looks too red, and optic disc has a pinkish, flushed appearance. *Treatment*.—Functional rest, local depletion by leeches or blister if necessary. Correction of ametropia by use of spectacles.

RETINITIS.—(a) *Syphilitic*; (b) *albuminuric*; (c) *apoplectic*; (d) *pigmented*.

SYPHILITIC RETINITIS.—One of the many secondary symptoms of syphilis—generally occurring between six and eighteen months after infection—occurs in inherited as well as in acquired syphilis. Ophthalmoscope shows a grayish white haze around optic disc, patches of yellowish white exudation over the fundus, generally more or less choroiditis, generally more or less turbidity of vitreous. *Treatment*.—Functional rest of eyes, general treatment for secondary syphilis.

ALBUMINURIC RETINITIS (Nephritic R.) may come on gradually with the advance of kidney disease; may be dependent on uræmia and occur in the later stages of kidney disease. May be caused by temporary albuminuria, as in that which occasionally occurs during pregnancy. In early stage sight may be unaffected. Ophthalmoscope shows a dull gray haze in central region of retina due to cedema, generally a few small patches of hemorrhage scattered over fundus. Optic disc may be also swollen. In advanced stage sight greatly affected in one or both eyes. Central region occupied by numerous dots, spots, or patches of an opaque white substance grouped around the yellow spot. Hemorrhages are frequent, and usually have a striated appearance. Optic nerve sometimes inflamed (neuroretinitis). Prognosis must be guarded. Treat disease of kidneys. Rest and protect eyes by cobalt-blue glasses.

RETINITIS APOPLECTICA.—From sudden hemorrhage from a retinal vessel, from disease of vessels, or of heart.

RETINITIS PIGMENTOSA.—Characterized by a peculiar deposit of dark pigment—varying in pattern—usually commences at the periphery of the fundus, and gradually approaches the centre. Optic disc of a pale yellow color. Often associated with posterior polar cataract. Often occurs in several members of the same family. *Prognosis* bad. May remain stationary. May go on from bad to worse.

DETACHMENT OF RETINA may be partial or entire. Causes: (a) *elonga-*

tion of coats of eyeball as in extreme myopia ; (b) diminution of vitreous ; (c) hemorrhage or serous exudation between retina and choroid ; (d) tumors of choroid. *Symptoms.*—By direct examination the detached portion appears as a bluish-gray film bounded by a sharp line. The vessels traced from disc give a sudden bend at the line of detachment. The detached portion is seen to be pushed forward, and the vessels upon it are tortuous, small, and of dark color. The field of vision is limited. *Prognosis* is unfavorable.

GLIOMA, a small round-celled growth proceeding from the granular layers of the retina, occurring generally in very young children. It is seen as a glistening white substance at the bottom of the eye, and if allowed to remain, it rapidly spreads along optic nerve to the brain, and to the surrounding structures within the orbit. Secondary deposits may occur. *Treatment.*—Early excision of globe.

Refraction of the eye signifies the influence exercised by the transparent media upon rays of light entering it.

EMMETROPIA signifies normal refraction.

AMETROPIA signifies abnormal refraction, and may be divided into (1) *myopia* ; (2) *hypermetropia* ; (3) *astigmatism*.

EMMETROPIA is that condition of refraction in which rays from distant objects, and which are practically parallel, come to a focus upon the retina when the eye is at rest, that is, when accommodation is relaxed. The *Emmetropic* eye cannot see *near* objects without increasing the convexity of the crystalline lens, because the rays from near objects are divergent, and would therefore focus behind the retina. This change of shape in the lens is effected by the ciliary muscle, and is called *accommodation*.

The farthest distance of distinct vision in any state of refraction is called the *far-point*, the shortest distance of distinct vision is the *near-point*. The *near-point* and the *far-point* are found by means of test types. Those of Snellen and Jæger are in common use. The distance between the near-point and the far-point is called the *range* or amplitude of *accommodation*. It is the distance over which the eye has command by means of its accommodation.

Accommodation, as we have seen, depends upon the contractility of the ciliary muscle, and upon the elasticity of the crystalline lens. Now, as age advances, the ciliary muscle gradually loses its contractility, and the lens its elasticity. So that in emmetropia the near-point gradually recedes from the eye. This recession commences at about the age of ten. Thus at the age of ten years the amplitude of accommodation is equal to a lens of 14 D, and the distance of the near-point from the eye is 7 centimetres ; at fifteen years the distance is 8 ctm. ; at twenty years it is 10 ctm. ; at thirty years it is 14 ctm. ; at forty years it is 22 ctm. ; at fifty years it is 40.5 cm.

The emmetropic eye, therefore, can read No. 6 of Snellen's test types

at the distance of six metres without the aid of either convex or concave lenses ($V=\frac{6}{6}$) at *all ages*. It can read No. 1 of Snellen's test-types for reading as near as 7 centimetres up to the tenth year of age, but after that time there is a gradual recession of this near-point. At the age of forty years the near-point is 22 ctm.

PRESBYOPIA (Old Sight) is that condition in which the near-point has so far receded as to cause discomfort in reading and fine work. This distance is about 22 ctm. (8 inches). In the *normal eye* this distance (*see* EMMETROPIA) is reached at about forty years, so that after that age all fine work, such as reading, needlework, etc., must be held at more than 22 ctm. from the eye. This inconvenience is easily overcome by prescribing convex lenses to be worn for reading and fine work. The following table will show the strength of the lens required by the normal eye at different ages, to correct for presbyopia :

Age.	Strength of Spherical Convex Lens in Dioptries.									
40	0
45	1
50	2
55	3
60	4
65	4.5
70	5.5
75	6
80	7

In *hypermetropia* presbyopia comes on earlier than in emmetropia, because the hypermetropia has to be neutralized before any accommodation is available for near vision. Thus, suppose a hypermetrope of 2 dioptries, what strength of lens would be required to correct his near vision at the age of fifty? He will require first 2 D to correct the hypermetropia, and, by the above table, we see that 2 D would be the strength required if he were emmetropic. Therefore, $2 + 2 = 4D$, or let x be the amount of hypermetropia expressed in dioptries, and x' the strength of lens required according to age, then $x D + x' D$ will be the strength of the spectacles required for near vision. In *myopia* presbyopia comes on later than in emmetropia, because for the same amount of accommodation the near-point is always nearer than in the normal eye. In very high degrees of myopia (over 4.5 dioptries) the patient will never become so presbyopic as to require convex glasses for near vision, because in a state of repose the eyes are adapted for a shorter distance than 22 ctm. He may, however, require concave glasses for *near* as well as for *distant* vision (*see* MYOPIA). Suppose a myope of 3 D, sixty years old, what spectacles would he require? We see by the

table that, if emmetropic, he would require 4 D, and we know that he has myopia = -3 D. Therefore $+4-3=+1$ D will be the strength of spectacles required for near vision.

MYOPIA (Short Sight) is that condition of refraction in which *parallel* rays come to a focus in front of the retina, the eye being at rest. *Symptoms*.—Patient cannot see distant objects clearly, and if told to read small print (No. 1 of Snellen's test types) will hold it within the distance of his far-point from the eye. Vision improved by concave spherical lenses, made worse by convex lenses. *Retinoscopy* reveals a shadow which passes in the same direction as the reflected light. *Ophthalmoscopy*.—1. By *direct examination* with mirror alone, image of vessels of fundus seen at distance from eye, and moves in the opposite direction to the observer's head when the latter is moved from side to side. 2. By *indirect examination*, the optic disc appears smaller than in emmetropia, and appears to increase in size on withdrawing the lens used. 3. By *direct examination*, when the instrument is held *close* to the patient's eye the retinal vessels, optic disc, and other details of the fundus cannot be clearly seen without the intervention of a concave lens, the strength of the lens required for this purpose being *a measure of the degree of myopia*. In many cases a crescentic patch of yellowish white appearance (*myopic crescent*) is seen on the outer side of the optic disc; this is caused by atrophy of the choroid. In high degrees of myopia other patches of choroidal atrophy are often seen. Choroidal hemorrhages and hemorrhages into vitreous occasionally occur. *Causes*.—Too great length of globe. Too great curvature of cornea. Too high refractive power of media of eye. Hereditary tendency. Prolonged use of eyes in looking at close objects. *Treatment*.—Having ascertained accurately the degree of myopia, order spectacles to be worn. 1. To give clear vision of object at a distance (No. 6 to 60 Snellen's at 6 metres). 2. To enable the patient to read small print (No. 1 Snellen) at the same distance as an emmetrope. In all cases of myopia below 6 or 7 dioptries, where the accommodation is good, the glasses which exactly correct the myopia should be used for near and for distant vision. They should be worn constantly. In most cases where the myopia is higher than 7 D, and in all cases where the *accommodation is feeble*, two kinds of spectacles must be worn: one pair for distance, equal in strength to the degree of myopia, another pair for near vision of lower power. The required strength of these is found in the following manner (Donders): *From the lens which exactly neutralizes the myopia deduct the strength of a lens whose focal length is equal to the distance at which we wish the patient to work*. Thus, suppose a myope of 10 D wishing to read No. 1 Snellen at 40 ctm. From 10 D deduct the lens whose focal length is 40 ctm., viz., 2.50 D; then $-10+2.50=-7.50$ D, and -7.50 D is the strength of spectacle required. In prescribing for patients over forty, proper allowance must be made for presbyopia (see PRESBYOPIA).

HYPERMETROPIA is that condition of refraction in which parallel rays come to a focus behind the retina—the eye being at rest.

Causes.—1. Most commonly the axis of the eye is too short. 2. The curvature of the cornea or of the surface of the lens may be insufficient. 3. The refractive index of the media may be too low. The disease is frequently hereditary.

Symptoms.—Since rays from a distant object (parallel rays) come to a focus *behind* the retina, it follows that rays from a near object (*divergent* rays) will be focussed still further *behind* the retina, and therefore a hypermetrope is unable to see anything clearly, either distant or near, without using *accommodation*. If therefore the *hypermetropia* be *slight*, and the accommodation powerful, there will be no inconvenience, either for near or distant vision. But if the *accommodation* is *failing*, as it always does from age, and as it frequently does from disease, the patient cannot see near objects for long together without aching pains or sense of fatigue in the eyes, combined with dimness of vision. In *high degrees* of hypermetropia the greater part of the accommodation is required for distant vision, and the patient is never able to see near objects clearly. The symptoms therefore vary with the degree, and become more manifest as age advances. Hypermetropia is frequently an indirect cause of squint (*see* STRABISMUS). The objective symptoms are as follows :

1. *Keratascopy* reveals a shadow which passes in the opposite direction to that of the reflected light.

2. *Ophthalmoscopy.*—*Direct method* at a good distance from the eye shows the image of vessels of fundus, and this image moves in the same direction as the observer's head when the latter is moved from side to side.

Indirect method shows size of disc to diminish on withdrawing the lens from patient's eye.

Direct method.—When oblique mirror is used close to the patient's eye, and the accommodation both of patient and observer relaxed, no clear detail of fundus can be made out without the aid of a convex lens. The strength of the lens thus required to make quite clear the detail of fundus gives an exact estimate of the degree of hypermetropia.

3. *By means of Test-types and Test-glasses.*—See if patient can read Nos. 6 to 100 Snellen at 6 metres. Then, if he can read the same as well or better with a convex glass, the highest glass with which he gets the best vision is a measure of his *manifest* hypermetropia. In children, and in all cases where spasm of the ciliary muscle is suspected, it is necessary to paralyze the accommodation by atropine drops, in order to obtain the *latent* as well as the *manifest*, that is, the total hypermetropia.

Treatment.—Having found the degree of hypermetropia, order spectacles to be worn as follows : 1. In children and young adults order the constant use of glasses both for near and distant vision ; the strength of these should be equal to all the manifest hypermetropia plus half the latent.

Patient may complain of inconvenience, but should persevere. 2. In persons over forty years of age order glasses as directed under Presbyopia (see PRESBYOPIA).

ASTIGMATISM is *Regular* or *Irregular*.

REGULAR ASTIGMATISM is that condition in which the refraction is different in different meridians of the same eye; the two principal meridians being always at right angles to each other.

IRREGULAR ASTIGMATISM is that condition in which there are different degrees of refraction in different parts of the various meridians. *Regular Astigmatism* may exist in five different forms.

1. *Simple Myopic*.—One meridian emmetropic, and the other myopic.
2. *Simple Hypermetropic*.—One meridian emmetropic, the other hypermetropic.
3. *Compound Myopic*.—Both meridians myopic, one more than the other.
4. *Compound Hypermetropic*.—Both meridians hypermetropic, one more than the other.
5. *Mixed*.—One meridian myopic, the other hypermetropic.

Causes.—Chiefly unequal curvature of cornea, perhaps irregularity of lens also. *Symptoms* vary with the *kind* and the *degree* of astigmatism. The lower forms often pass unheeded until rather late in life. The higher forms cause such fatigue and distress that the eyes are disqualified from prolonged exertion. Astigmatism must always be suspected when by testing with spherical lenses the patient cannot be made to read Nos. 6 or 9 Snellen at 6 metres (the fundus being otherwise healthy). When astigmatism is suspected, proceed to examine each eye carefully as follows:

1. *Retinoscopy*.—The intensity, direction, and velocity of shadow will indicate the *kind* of error in each meridian.
2. *Ophthalmoscopy*.—By indirect examination the optic disc appears oval instead of circular, and by withdrawing the mirror used away from the patient's eye the disc appears to change its shape. By direct examination, the mirror being held close to patient's eye, the vessels of the different meridians may be seen with lenses of different powers, the difference between the powers of the lenses thus used being an exact measure of the degree of astigmatism.

3. Place patient at distance of six metres from Snellen's test-types, and with spherical lenses correct the ametropia as far as possible. Then rotate in front of the correcting lens a stenopaic slit; by this means the two principal meridians will be found, and must be corrected seriatim. The difference of power between the lenses which correct these two meridians is an exact measure of the degree of astigmatism. The same object may be effected by the use of cylindrical glasses without the slit.

4. An excellent instrument for finding the two meridians is Tweedy's Optometer (see *Lancet*, October 28, 1876).

Whatever means be employed in diagnosis, *cylindrical* lenses should be prescribed which fully correct the astigmatism. The patient may not be able to see very much at first, but by the *continued use* of spectacles the vision will generally improve.

Strabismus (Squint).—The visual line is the axial line joining the centre of the object observed, with the centre of its image on the yellow spot of the retina. Deviation of the eye from the visual line, so that the image does not fall on the yellow spot, but on some other part of the retina, is called squint. This deviation may produce double vision—*diplopia*—when the image formed by the squinting is usually fainter than that of the other eye, and is called the *false* image. When the false image appears on the same side of the true image as the deviating eye, the diplopia is termed *homonymous*, when on the opposite side the diplopia is *crossed*. The greater the deviation of the eye the fainter the image appears, as it falls more upon the periphery of the fundus. Patients learn to disregard the false image, and so to use one eye at a time or one eye only. *Causes of Squint*.—(a) *Ametropia*; (b) affection of ocular muscles, as over-action, weakness, paralysis; (c) disuse of eye. Chief kinds are internal and external.

INTERNAL STRABISMUS (Convergent).—Very common, generally caused by hypermetropia. In hypermetropia the patient is obliged to use accommodation in order to see even distant objects. Now accommodation is always accompanied by convergence, and when a near object has to be seen, the accommodation and, consequently, the convergence used, are so great that the eyes deviate internal to the visual line, so that the image does not fall upon the yellow spot, and is therefore not distinct. Patient then fixes one eye upon the object, *i.e.*, causes it to move in the direction of the visual line whilst the other eye still deviates. The amount of deviation is measured by the distance between two vertical lines, one bisecting the pupil, the other bisecting the eyelids. *Diagnosis*.—In well-marked cases let patient look steadily at the tip of index finger placed about a foot in front of eyes, then screen each eye successively, and watch the eye thus screened. The squinting eye makes a decided movement toward the visual line when the working eye is covered, but the working remains quite stationary when the squinting is screened. In less marked cases the diagnosis is more difficult. Take patient into dark room and direct him to look steadily at lighted candle at distance of ten feet without moving his head. Place a piece of red glass in front of one eye, then if diplopia be present the image of this eye will be red and that of the other eye of normal color. The distance of these images apart and their relative position gives the character of the deviation—homonymous diplopia indicating convergent, and crossed diplopia indicating divergent strabismus. *Treatment*.—1. If the patient be hypermetropic, if squint be slight and of recent date, and if vision be good in both eyes, try the effect of well-fitting convex spectacles

for one or two months. 2. Perform TENOTOMY of the internal rectus of one or both eyes. Both eyes generally require to be operated on. *Operation.*—Separate lids by stop-speculum, let assistant turn eye outward by forceps, with toothed forceps pinch fold of conjunctiva between cornea and caruncle, with squint-scissors cut through this and through the capsule of Tenon, pass squint-hook beneath the tendon from below and cut it through between hook and globe, pass in the squint-hook a second time to be quite sure that the tendon is divided; suture for conjunctival wound is not generally used.

EXTERNAL STRABISMUS (Divergent) is the result of weakness of the internal rectus; commonest in myopia; occasionally occurs in hypermetropia; sometimes occurs in a blind eye; may follow tenotomy of internal rectus where too much subconjunctival tissue has been divided; common in partial or complete paralysis of the third nerve. *Diagnosis*, the same as for internal strabismus. *Treatment.*—If resulting from paralysis, try and find the cause of paralysis and treat this; if not from paralysis, perform tenotomy of the external rectus, and if necessary also, at the same sitting, perform the operation for *readjustment or advancement* of the internal rectus. This is done in various ways, and consists of separation of the muscle from its insertion into sclerotic, and bringing it further forward on sclerotic by means of sutures passed through the muscle and attached to conjunctiva close to cornea.

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INDEX OF NAMES.

(See also end of "*Notes on Ophthalmic Surgery.*")

-
- ABBE, 280
Abrath, 102
Adams, 115, 230, 283, 285
Allarton, 172
Alibert, 56
Allingham, 60
Amussat, 60
Anel, 15
Annandale, 230
Antyllus, 15, 17
Arnott, 42
Ayres, 29
- BAKER, MORRANT, 14, 37, 42, 199, 235
Barker, A., 21
Barwell, 59, 116, 158, 190
Bassereau, 219
Bäumler, 288
Beck, Marcus, 160, 161
Bellocq, 76
Bernard, 1
Bickersteth, 207
Bigelow, 32, 170, 174, 175
Billroth, 37, 38, 54, 98, 100, 109, 112, 144,
153, 200, 201, 204, 207, 218, 232
Birkett, 130, 189
Bloxam, 64
Brandeis, 183
Brasdor, 15, 17
Brodie, 28, 35
Brou, 103
Brown, G., 57
Brown-Séguard, 232
Browne, Baker, 192
Browne, Lennox, 169, 183
- Brunel, 169
Bryant, 22, 51, 92, 111, 120, 135, 185, 194,
206, 269
Buchanan, 172
Bumstead, 289
Burdon-Sanderson, 145
Busch, 162
Busk, 28
Butcher, 78
Butlin, 39, 237
- CADGE, 170
Callender, 72, 94, 187, 198, 270
Callisen, 60
Carden, 10
Carte, 15
Cassells, 183
Chapman, 147
Charcot, 178, 201, 282
Chauveau, 280, 282
Cheyne, Watson, 104, 282
Chiene, 102, 162, 284
Chopart, 7
Civiale, 173, 175
Clarke, Bruce, 95
Clarke, Fairlie, 237
Clay, 196
Cline, 87, 91, 97
Clover, 9, 12, 32, 173, 175, 237
Coats, 232
Cock, 71
Cohnheim, 145
Colles, 72, 95
Collins, 119
Cooper, Sir Astley, 43

Cooper, T., 102
 Coote, Holmes, 237
 Corrigan, 28, 204
 Cowling, 218
 Coxeter, 107
 Creighton, 291
 Cripps, 19
 Crocker, 197
 Croft, 78
 Curling, 227, 229

D'ANCONA, 45
 Davy, 8, 111, 213
 Delahaye, 167
 De Lignorolles, 8
 Delorc, 163
 Desmarres, 224
 De Wilde, 106
 Diday, 225, 290
 Dieulafoy, 188
 Dolbeau, 173
 Donovan, 74
 Doran, 285
 Dreschfeld, 142
 Druitt, 49
 Duchenne, 178, 179
 Dunn, 269
 Dupuytren, 65, 215
 Duret, 73, 240
 Durham, 239

EADE, 33
 Eidam, 281
 Erb, 179, 182
 Erichsen, 35, 92, 124, 189, 190, 237
 Esmarch (including "the bandage"), 6,
 16, 37, 38, 54, 78, 80, 151, 277
 Evans, 84

FAUVEL, 167
 Ferguson, 187
 Ferrier, 73, 240
 Fitzgibbon, 234
 Flower, 71
 Foster, Michael, 264
 Fränkel, 288
 Frazer, 234
 Fritz, 240
 Fuller, 239

GAMGEE, 120, 185, 276, 277
 Garrod, 234
 Garson, 133
 Gee, 289
 Gmelin, 264
 Golz, 208
 Goodhart, 133, 211
 Gordon, 89, 95
 Gritti, 10, 171
 Gross, 29
 Guthrie, 25

HAINSBY, 116
 Halford, 28
 Hall, Marshall, 25
 Hamilton, 79
 Hancock, 8
 Hart, 16
 Hasse, 139
 Hawkins, Cæsar, 61
 Henlé, 182
 Hennig, 288
 Hey, 7, 35, 37
 Hill, Berkeley, 235
 Hilton, 3
 Hitzig, 240
 Holmes, 14, 17, 29, 34, 56, 63, 66, 105,
 116, 177, 215, 267
 Hood, 218
 Howard, 25
 Howse, 269, 288
 Humphry, 98, 191, 206, 228, 229
 Hunter, 15, 219, 220
 Hutchinson, J., 147, 219, 225, 267, 289,
 290
 Hyde, 12

ILOTT, 193

JACKSON, HUGHLINGS, 289
 Jordan, Furneaux, 39, 150, 190

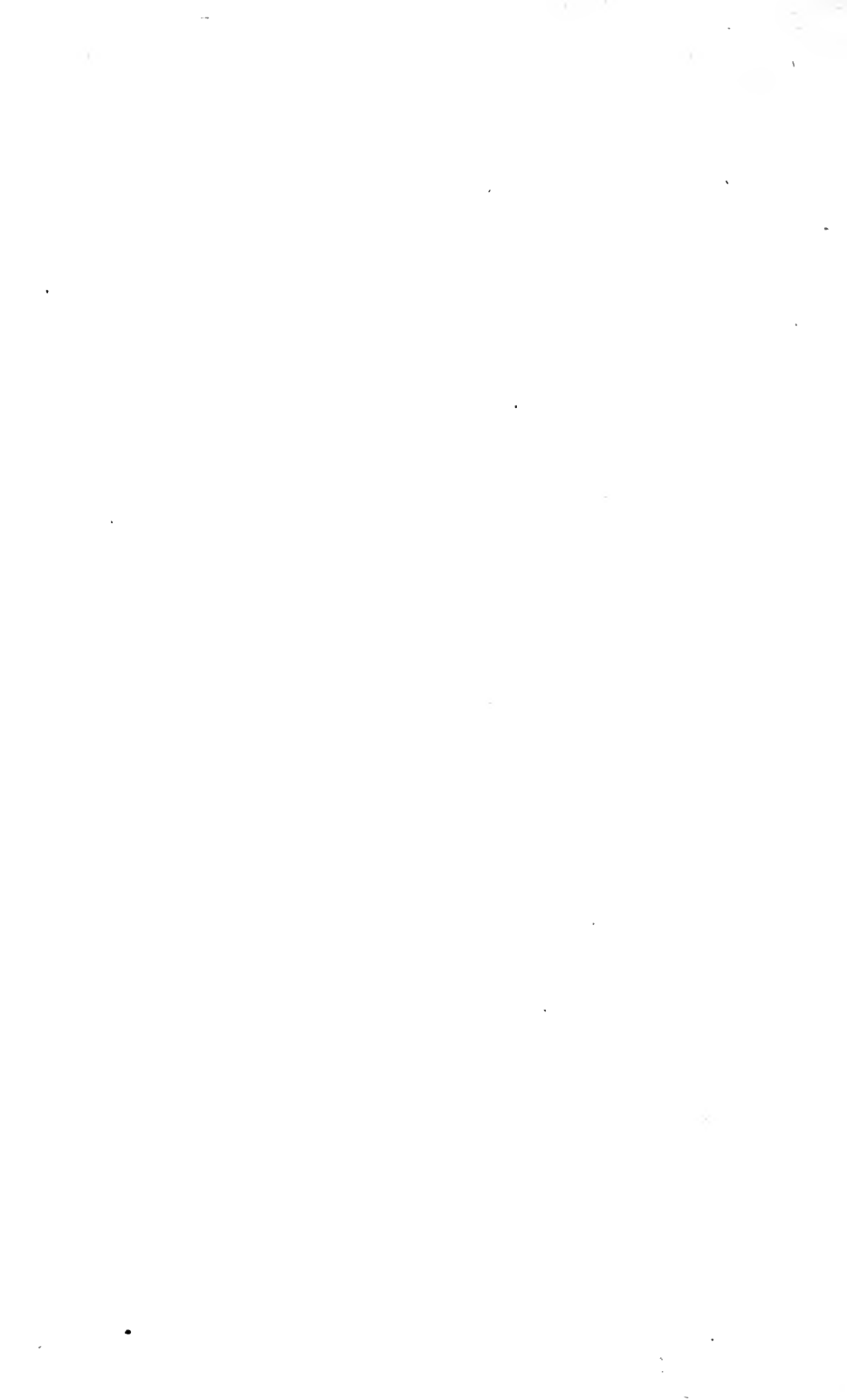
KEBER, 289
 Klebs, 279, 280, 282, 291
 Klein, 291
 Koch, 280-282

LALLEMAND, 141, 210
 Lancereaux, 221, 223

- Langenbeck, 151, 185
 Langton, 130
 Lawson, 239, 240
 Leach, H., 206
 Lecompte, 106
 Lee, 269, 270
 Lees, 179
 Legg, 109
 Lewis, 136
 Lisfranc, 8
 Lister, 6, 7, 8, 9, 18, 80, 88, 98, 111, 276, 277
 Liston, 87, 90, 91
 Littré, 60
 Longmore, 106, 107
 Louis, 73
 Lowne, 215
 Lucas, Clement, 202
 Lyons, 93, 236, 290
- MACEWEN, 162, 166, 284, 285
 McIntyre, 87, 97
 Malgaigne, 64, 94
 Marsh, H., 153, 207, 288
 Marshall, 40
 Martin, 158, 239
 Mikulicz, 162
 Mills, 152, 237
 Milton, 44, 102
 Montgomery, 143
 Morgan, 268
 Morton, 215
 Moullin, 208
 Murray, 17
- NARES, SIR GEORGE, 206
 Neale, 189
 Nélaton, 8, 68, 95, 106
 Niemeyer, 49, 139, 165, 178, 182, 209
 Nunneley, 236
- OGSTON, 60, 162, 280, 284
 Orth, 279
 Osborne, 137
 Otis, 170
 Owen, 288
- PACKARD, 80
 Pagan, 229
- Page (Carlisle), 227
 Paget, Sir J., 3, 31, 37, 38, 55, 84, 98, 139, 141, 159, 160, 175, 197, 198, 204, 205, 208, 218, 225, 236, 270, 271
 Partridge, 191
 Pasteur, 276, 280, 282
 Pavy, 264
 Peitavy, 75
 Petit, 111
 Pilcher, 95, 218
 Pirogoff, 6, 8
 Pirrie, 4
 Poland, 233
 Pollock, 148, 187
 Porter, 109
 Pott, 39, 40, 65, 91, 122, 137, 203, 208, 211
- REEVES, 162
 Regnoli, 236
 Reid, W., 15
 Rendle, 12
 Reynolds, 178
 Richardson, 232, 236, 271
 Ricord, 221
 Rindfleisch, 32, 280
 Ringer, 164
 Rivington, 17
 Rizzoli, 151
 Robbins, 12
 Roosa, 183
- SALTER, 80, 87, 158
 Sansom, 55
 Savory, 139, 205, 208, 214, 228
 Sayre, 18, 26, 78, 135, 158, 190, 203, 209, 212, 214, 216
 Séquard, Brown-, 232
 Scarpa, 59
 Schoenlein, 279
 Schrötter, 166
 Schüller, 291
 Scott, 156, 158
 Sédillot, 236
 Sibley, 52
 Sigmund, 225
 Signorini, 111
 Simon, 143
 Simpson, Sir J., 4
 Sims, Marion, 57

- Sinkler, 178
 Skey, 71
 Smith, Alder, 133
 Smith, H., 114
 Smith, N. R., 172
 Smith, T., 7, 33, 116, 180, 187, 192, 237
 Smyth, 24
 Spence, 6, 10, 94
 Square, 160
 Stanley, 39, 82
 Startin, 187
 Staton, 101
 Sylvester, 25
 Syme, 3, 7, 17, 229
- TAYLOR, 289
 Teale, 5, 6, 10
 Teale, T. P., 159
 Teevan, 29, 172, 195
 Thomas, W., 75
 Thomas (Liverpool), 135
 Thompson, Sir H., 26, 28, 49, 102, 170,
 191, 194, 195, 196
 Thompson, Hugh, 290
 Tiemann, 107
 Toussaint, 282
 Trendelenburg, 152, 166, 239
- Trommer, 264
 Troussseau, 138, 178
 Tufnell, 16
- VANZETTI, 57
 Vermale, 10
 Verneuil, 101
- WAGSTAFFE, 44
 Wakley, 258
 Walker (Peterborough), 213
 Walsham, 34, 39, 52
 Wardrop, 17
 Watson, P. H., 15, 80
 Weeks, 25, 26
 Wegner, 289
 Wheelhouse, 29, 263
 White, P. P., 29
 Whitehead, 237
 Wilders, 102
 Willett, 17, 84, 210, 213
 Williams, C. J. B., 205
 Wolfe (Glasgow), 209
 Wood, John, 29, 126, 190
 Wormald, 237, 268





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